

Spring 2013



April 9th, 2013

UPPER COLORADO RIVER REGIONAL DROUGHT
EARLY WARNING SYSTEM

Weekly Climate, Water & Drought Assessment

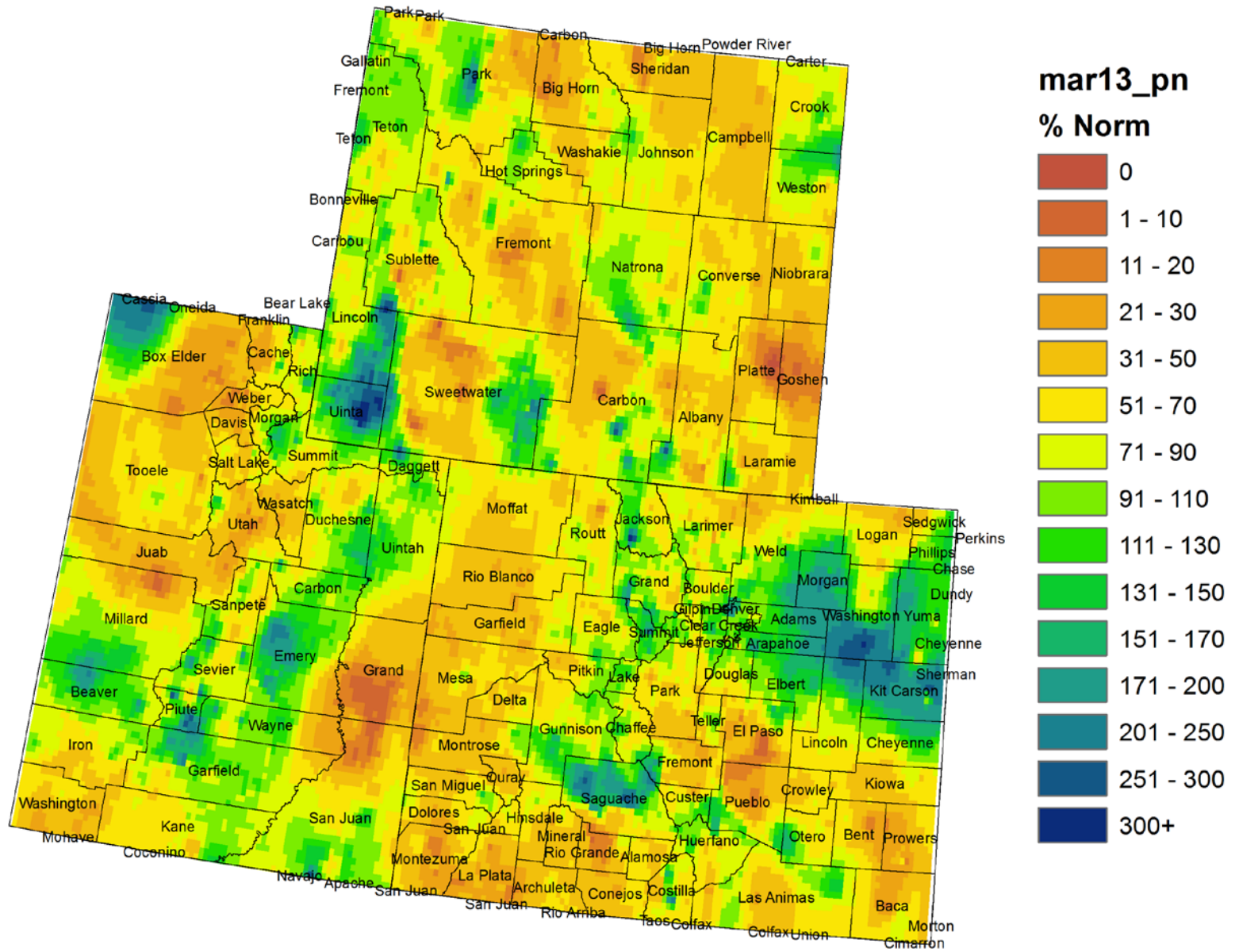
Today's Agenda

- Assessment of current water conditions
- Precipitation Forecast
- Recommendations for Drought Monitor

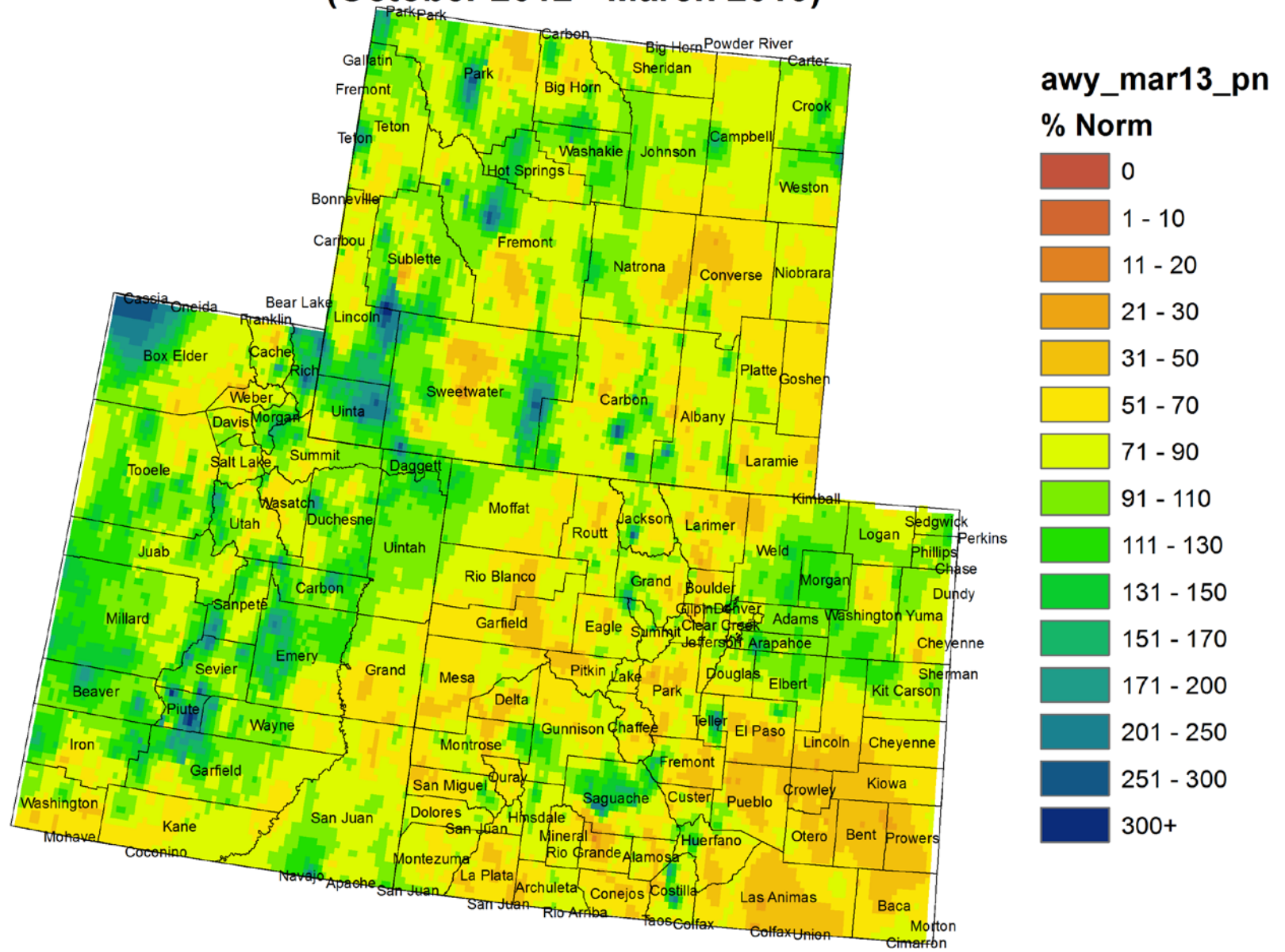
Precipitation/Snowpack Update



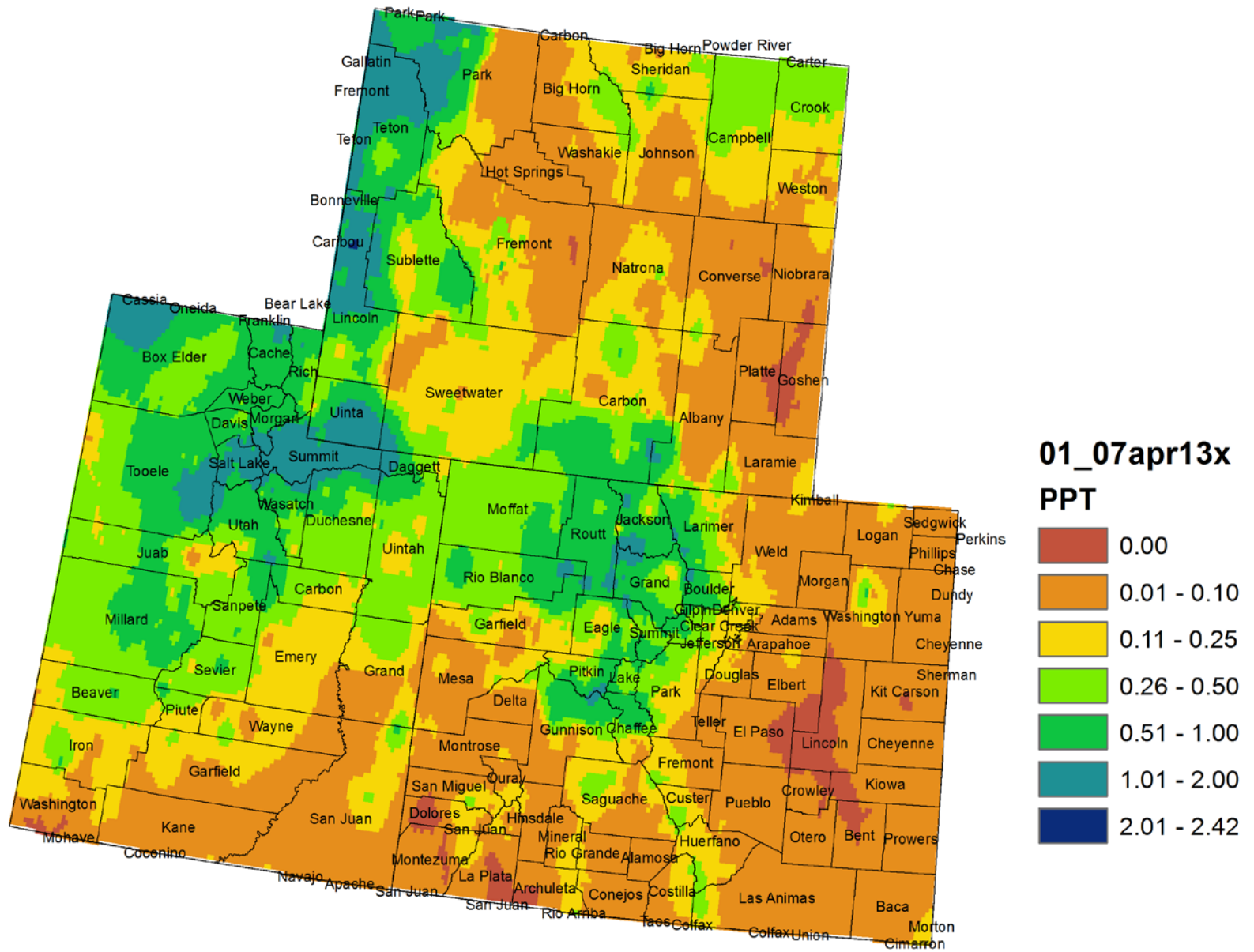
Colorado, Utah and Wyoming March 2013 Precipitation as Percentage of Normal



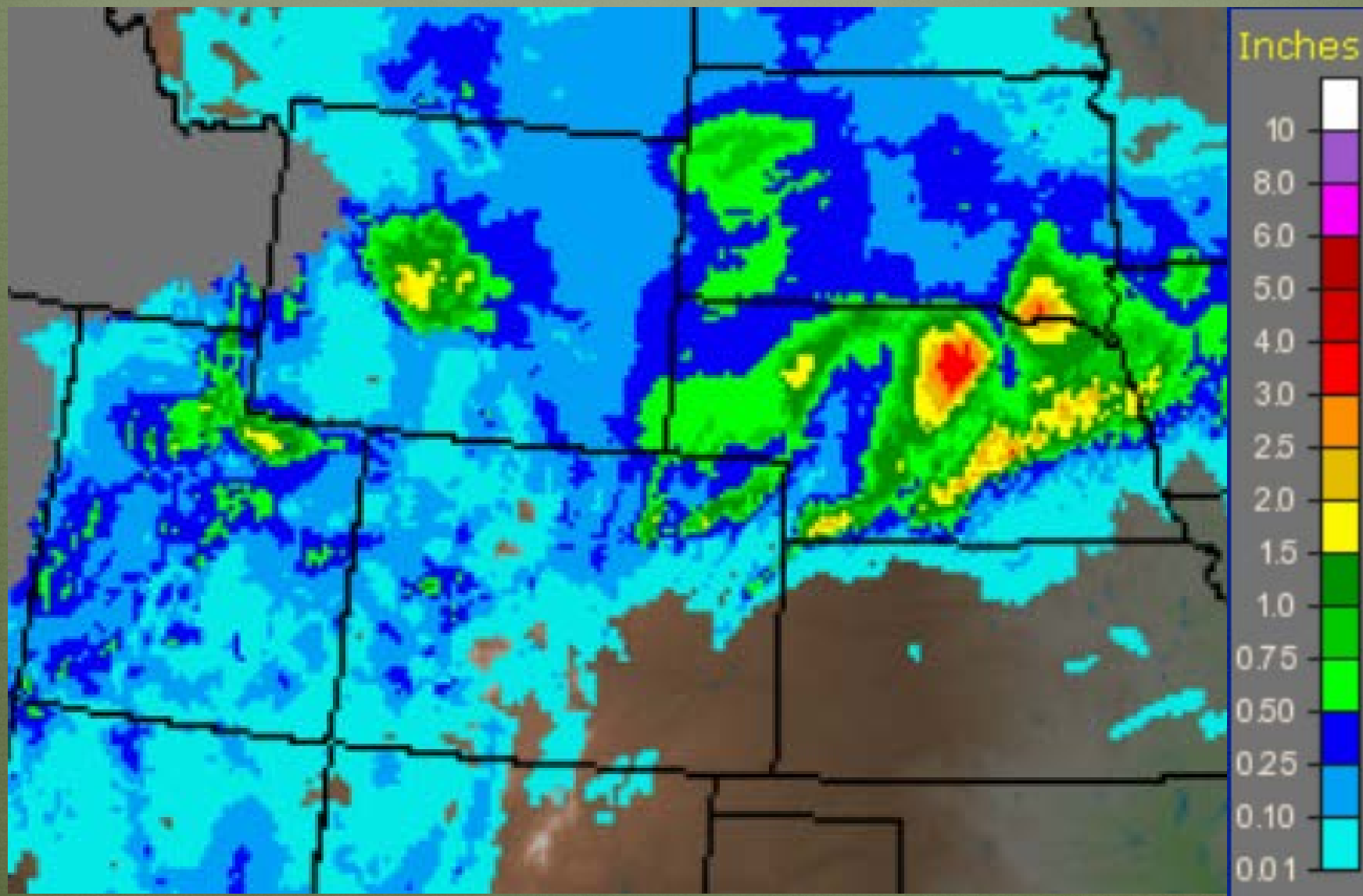
Colorado, Utah and Wyoming Water Year 2013 Precipitation as Percentage of Normal (October 2012 - March 2013)



Colorado, Utah and Wyoming 7 Day Precipitation (in) 1 - 7 April 2013

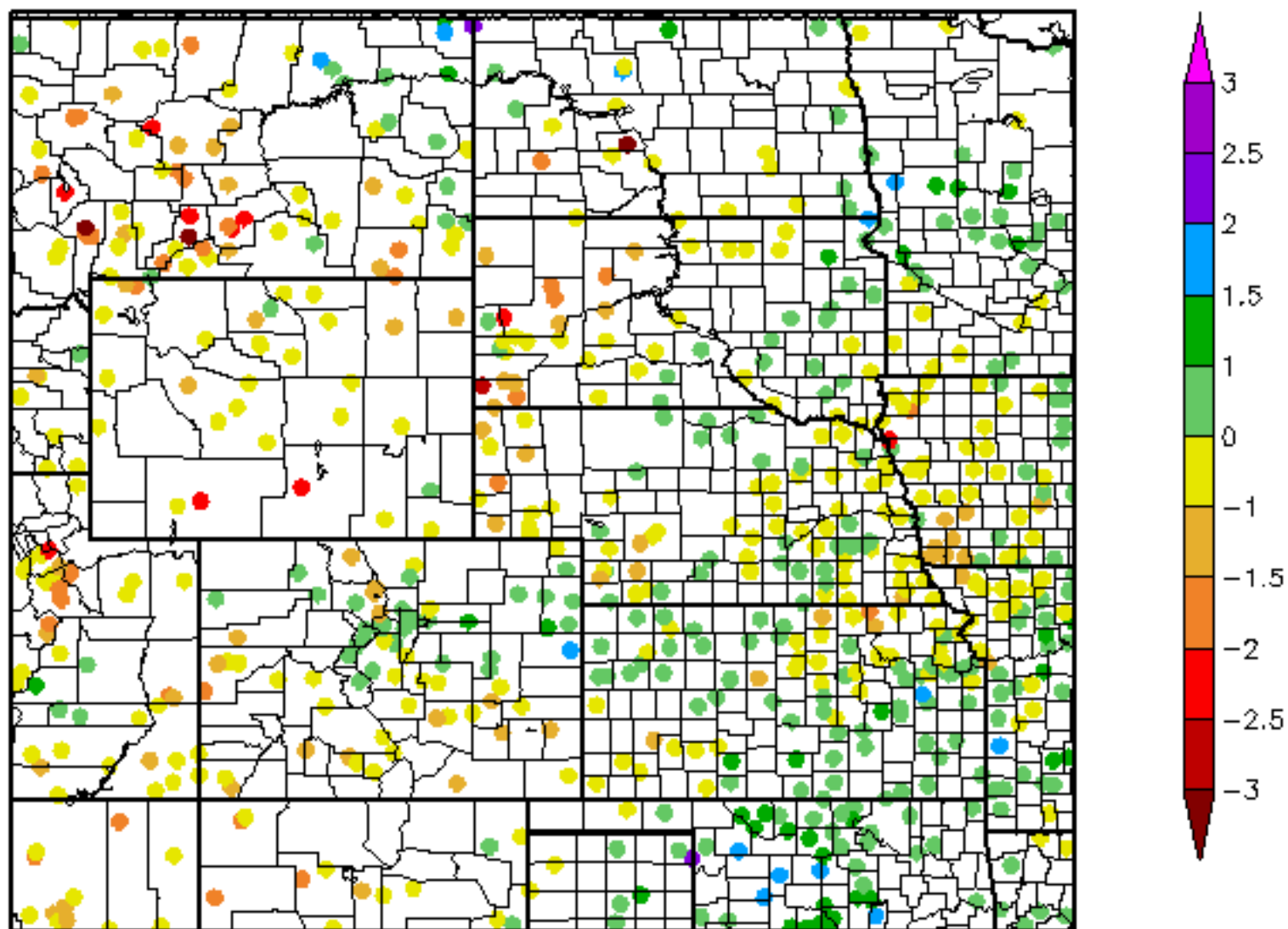


AHPS Precipitation Analysis 8 April 2013



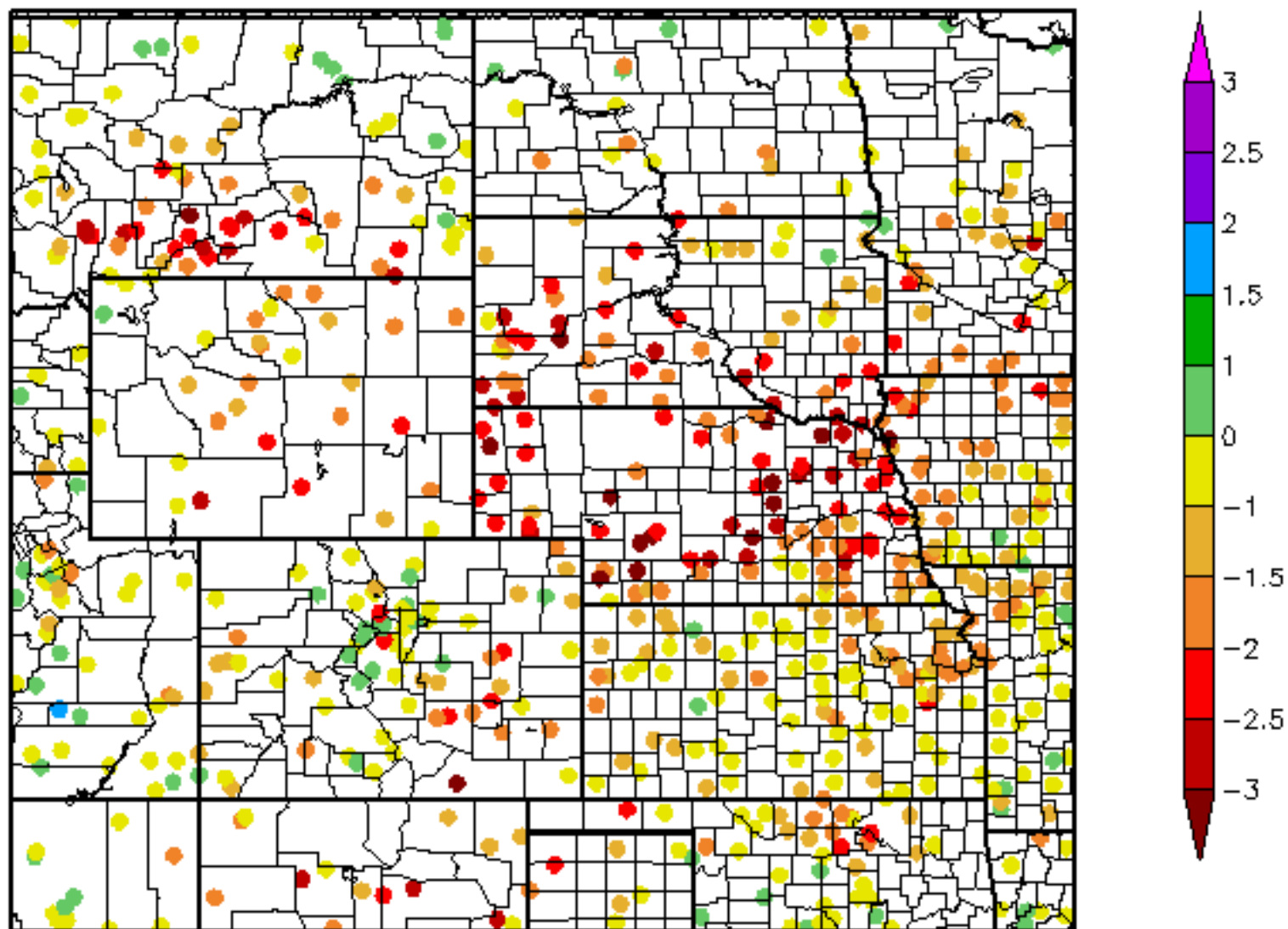
60 Day SPI

2/7/2013 - 4/7/2013



9 Month SPI

7/8/2012 - 4/7/2013



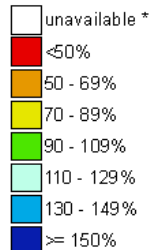
Snowpack



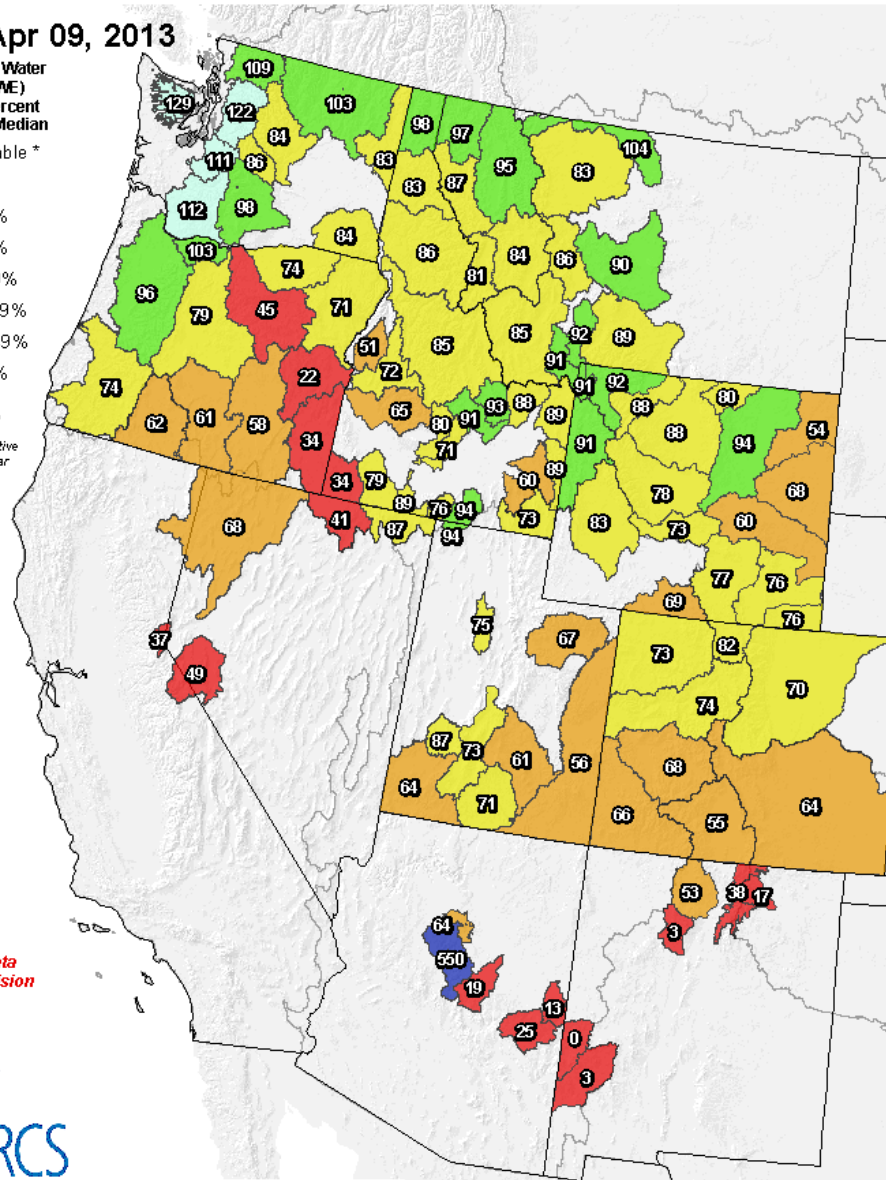
Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Apr 09, 2013

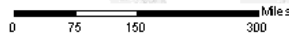
Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median



* Data unavailable at time of posting or measurement is not representative at this time of year



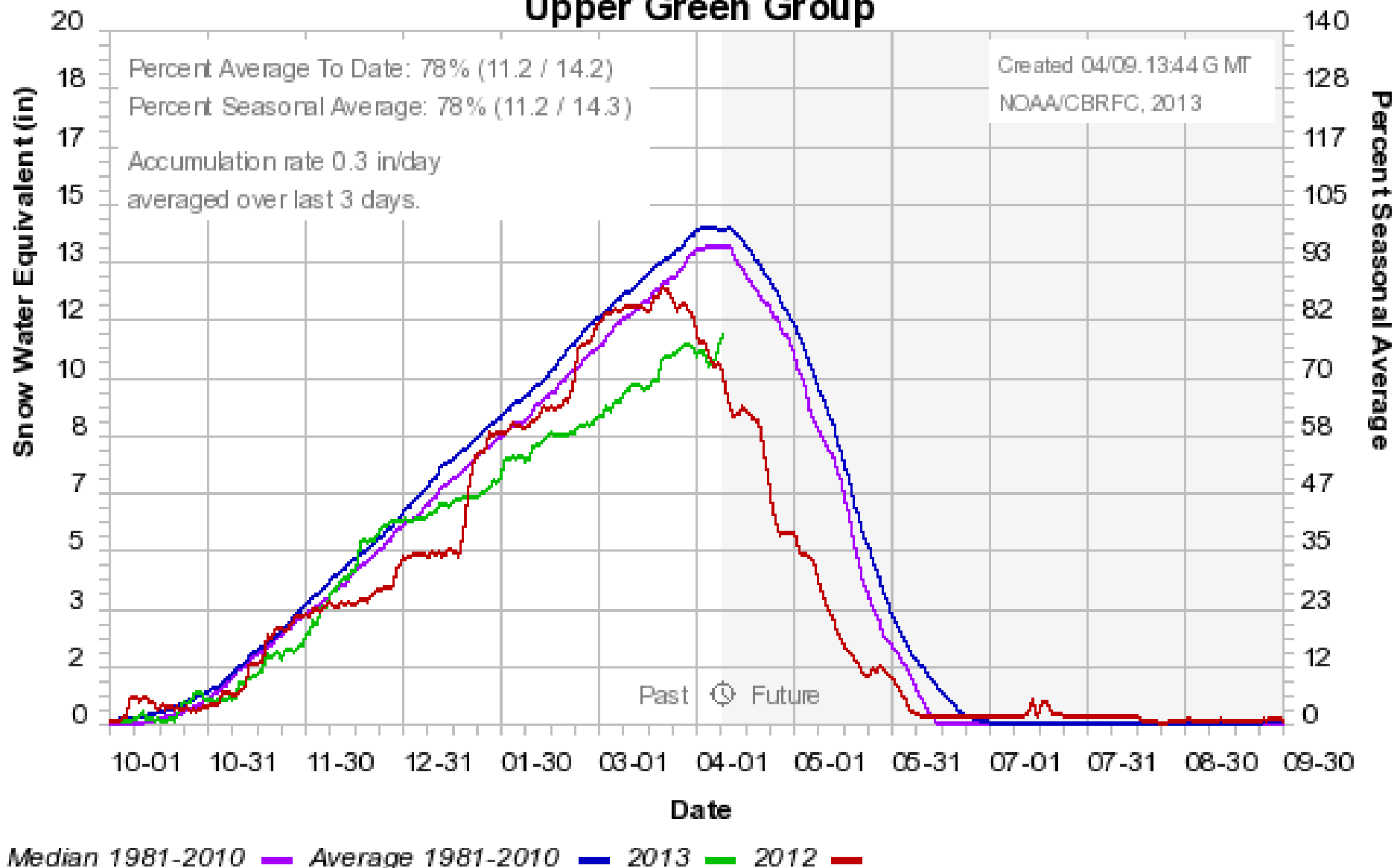
Provisional data subject to revision



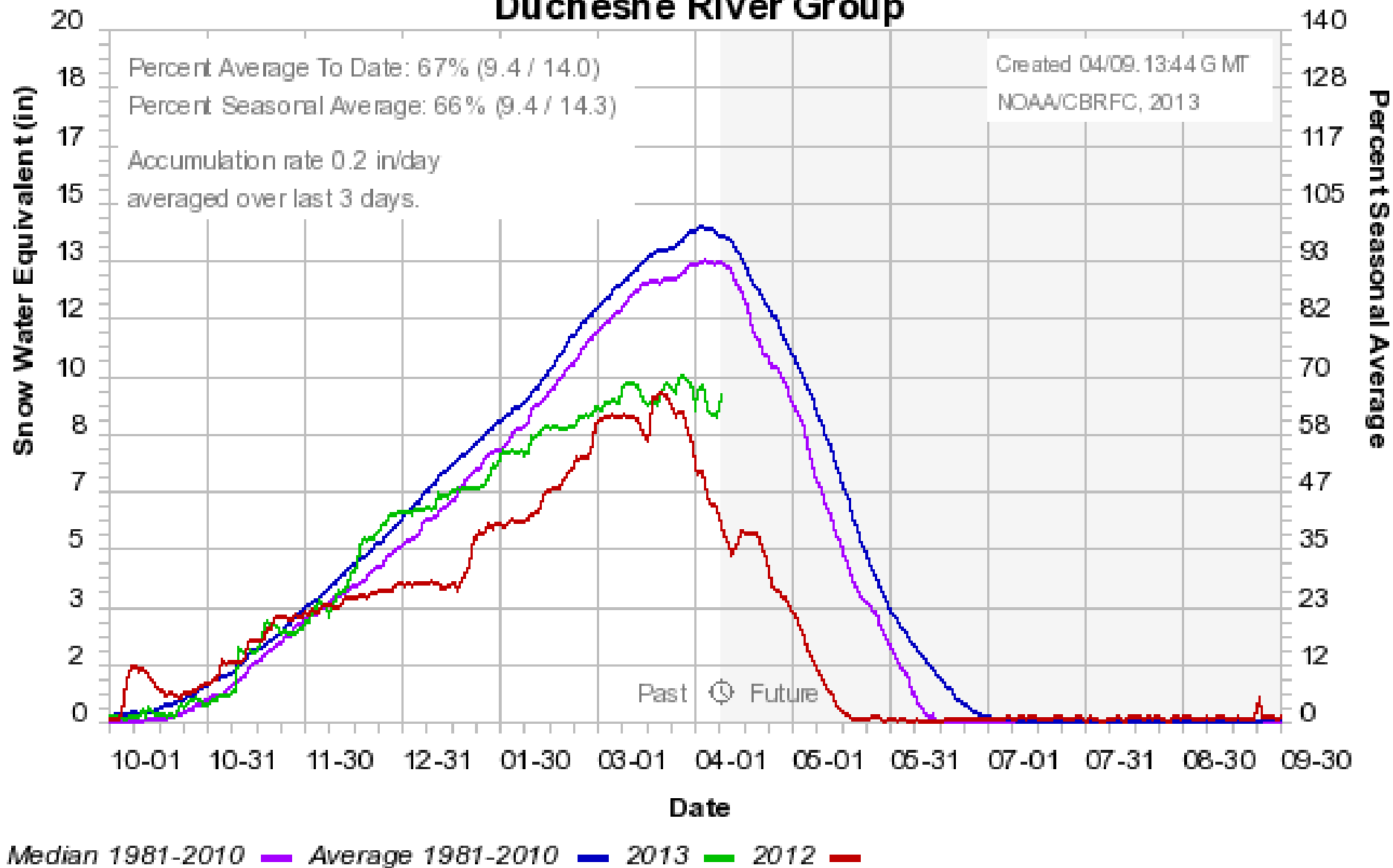
The snow water equivalent percent of normal represents the current snowwater equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by the USDA/NRCS National Water and Climate Center
 Portland, Oregon <http://www.wcc.nrcs.usda.gov/gis/>
 Based on data from <http://www.wcc.nrcs.usda.gov/reports/>
 Science contact: Jim.Marron@por.usda.gov 503 414 3047

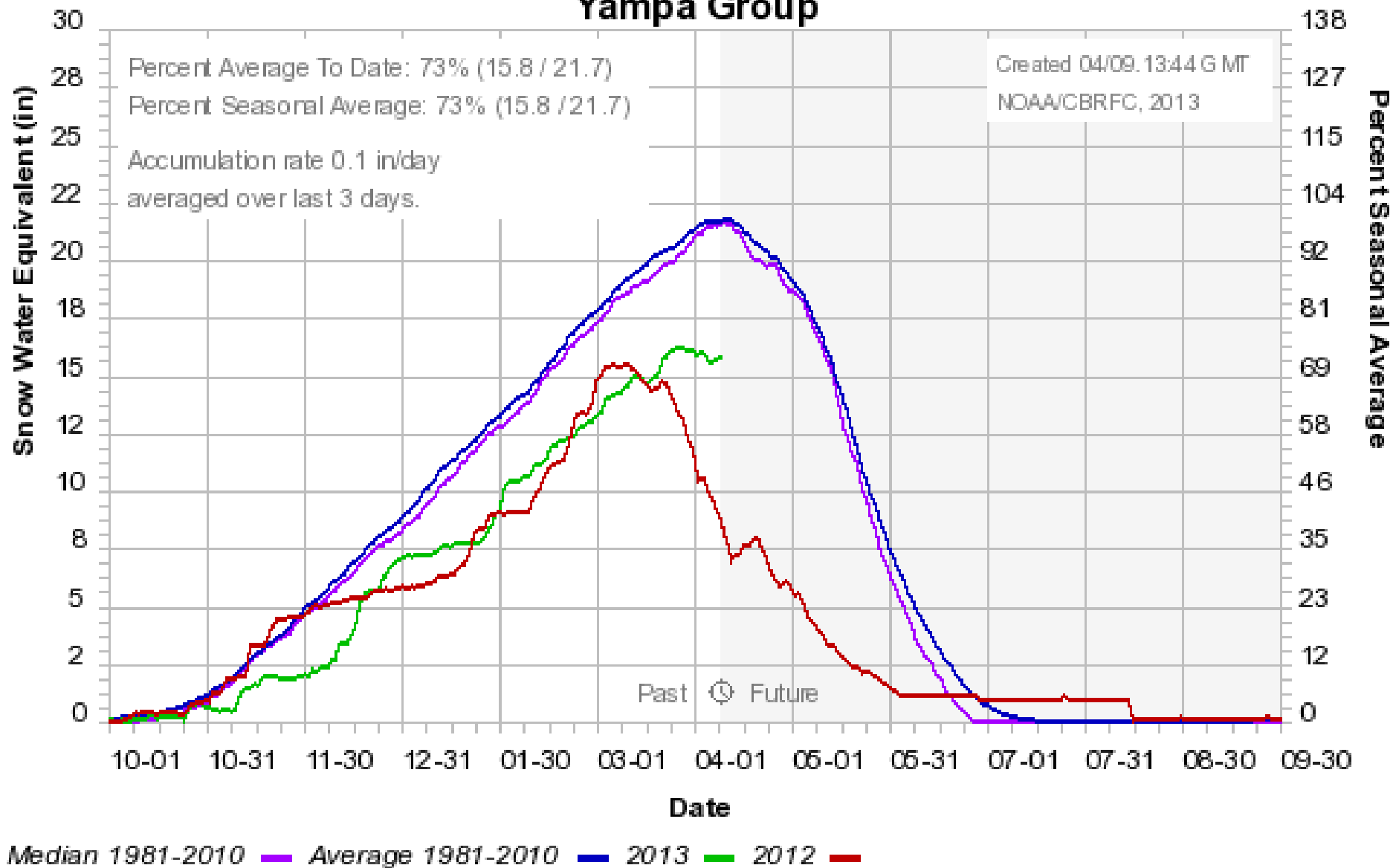
Colorado Basin River Forecast Center Upper Green Group



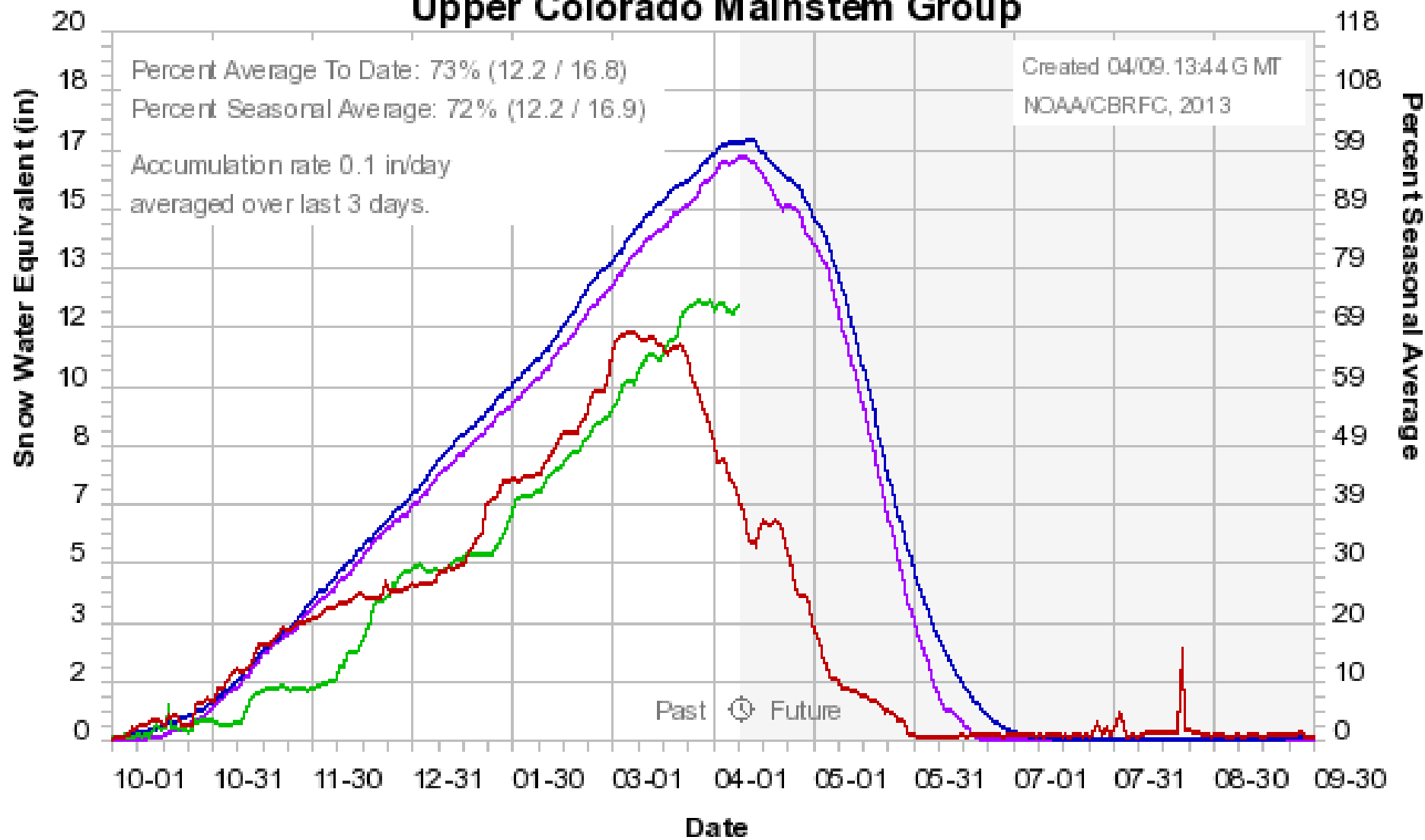
Colorado Basin River Forecast Center Duchesne River Group



Colorado Basin River Forecast Center Yampa Group

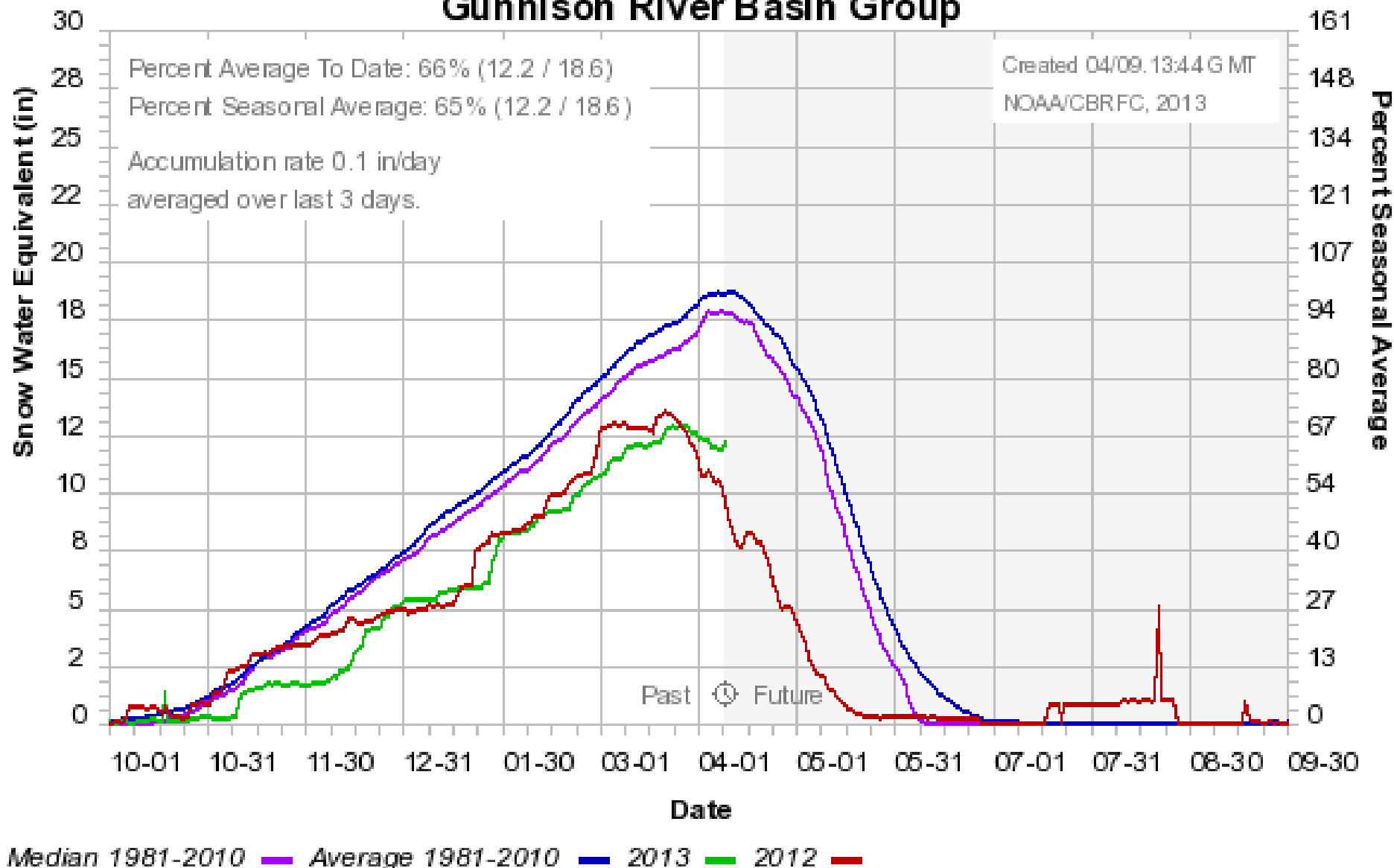


Colorado Basin River Forecast Center Upper Colorado Mainstem Group



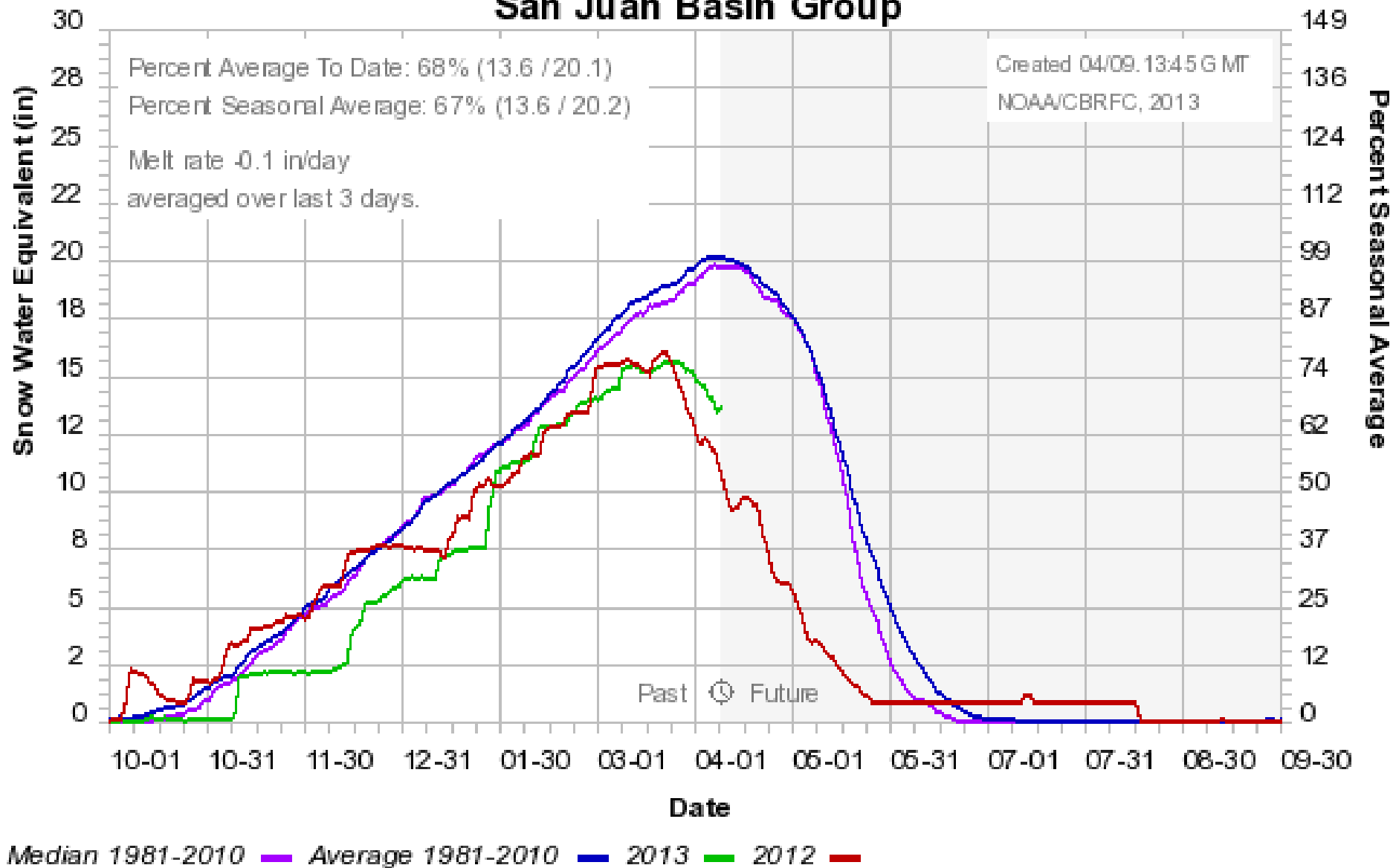
Median 1981-2010 Average 1981-2010 2013 2012 2011

Colorado Basin River Forecast Center Gunnison River Basin Group



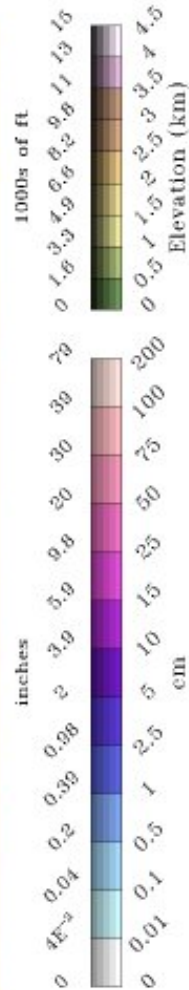
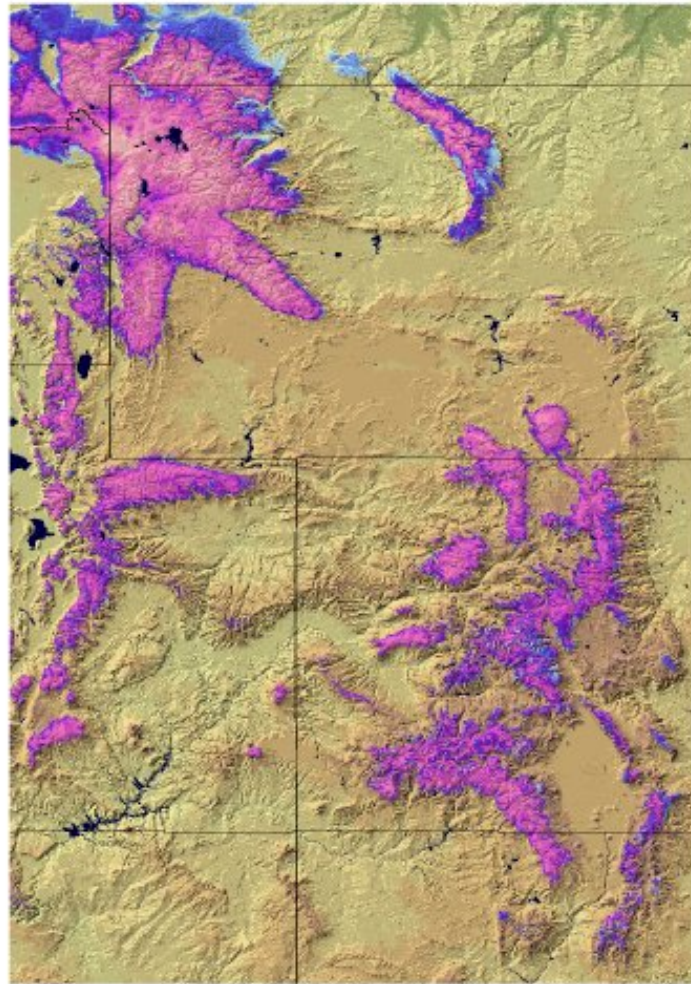
Colorado Basin River Forecast Center

San Juan Basin Group



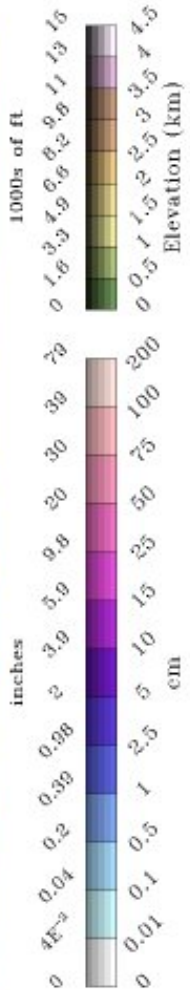
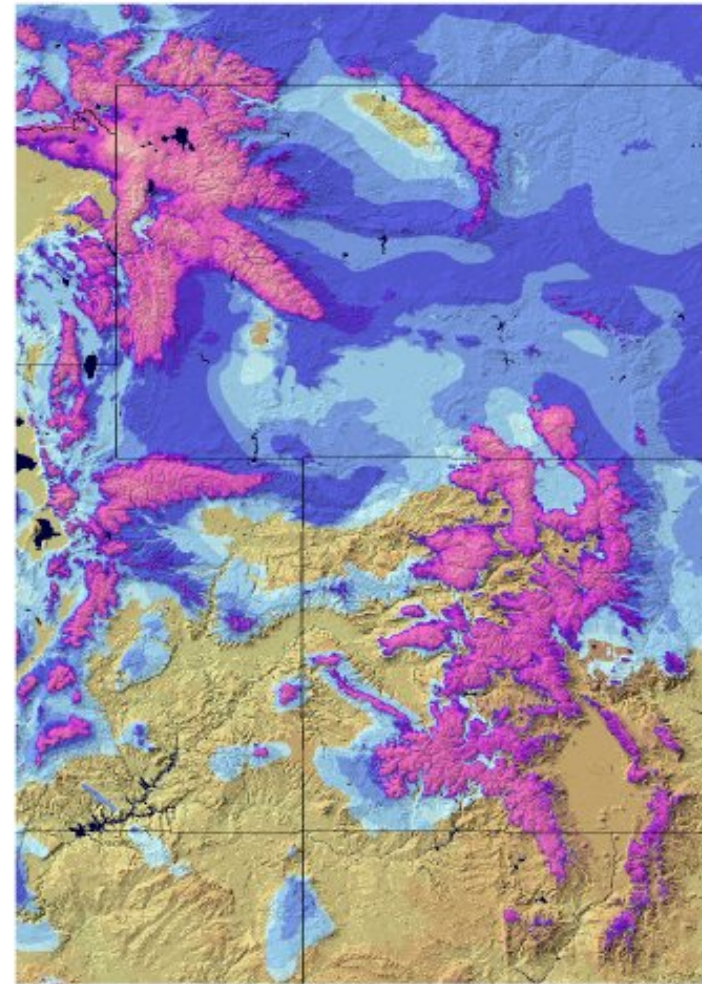
Snow Water Equivalent

2012-04-09 06



Snow Water Equivalent

2013-04-09 06

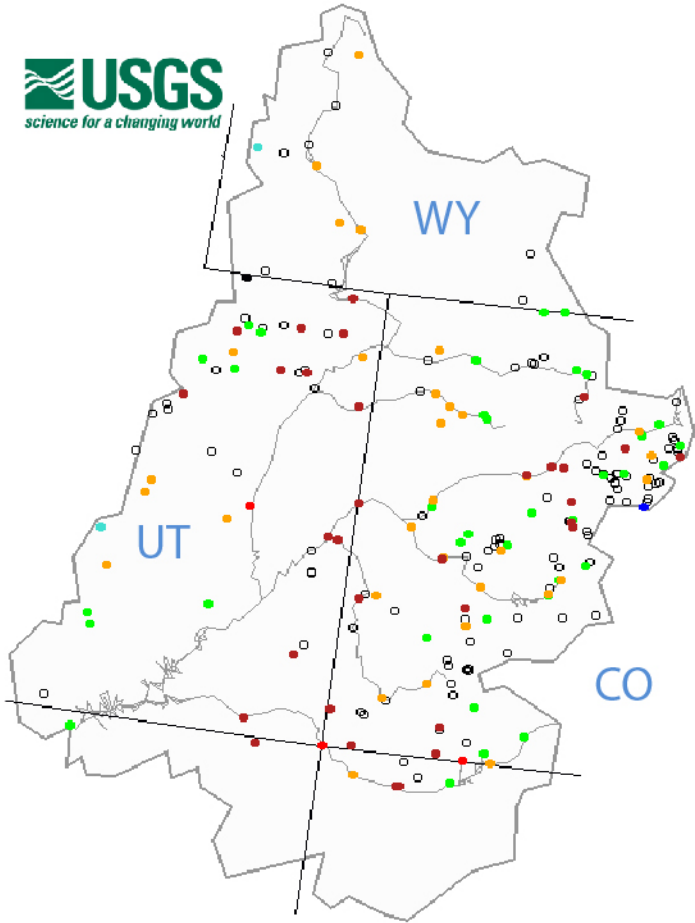


Streamflow Update

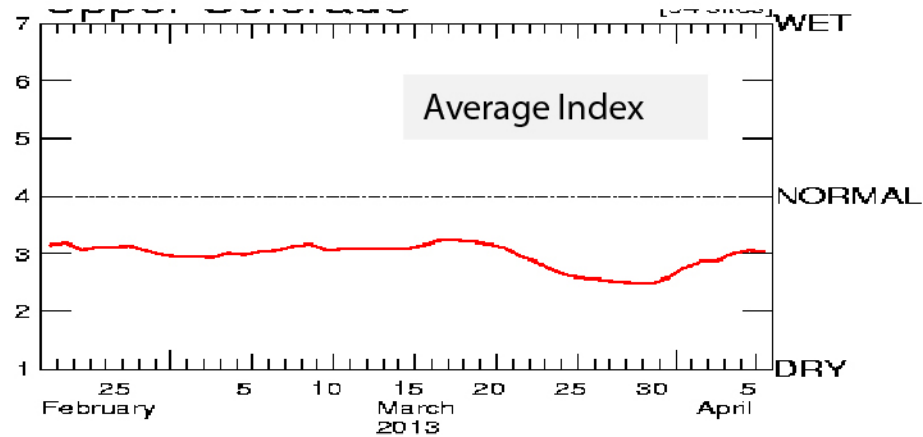
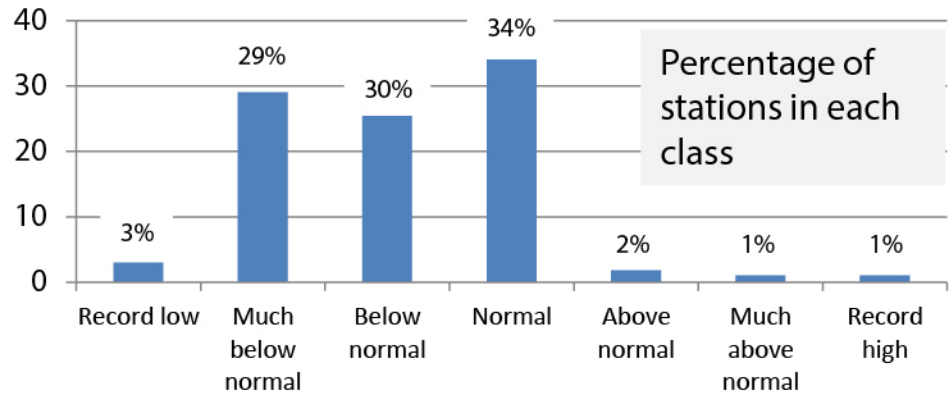
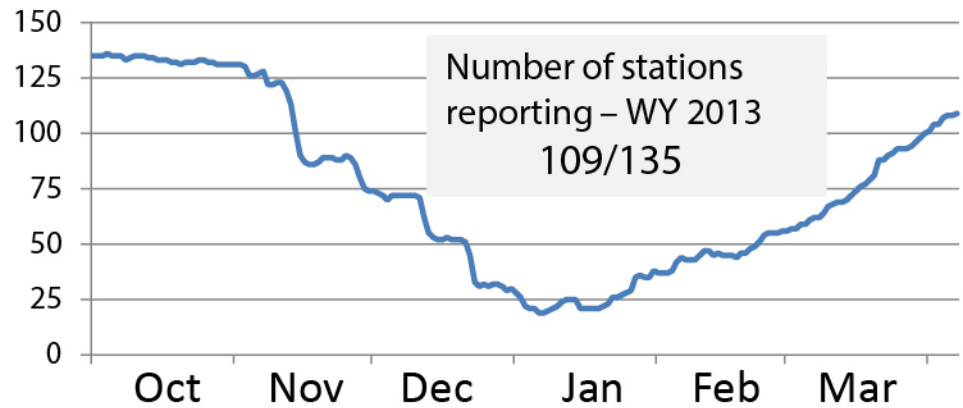
Bob Kimbrough | U.S. Geological Survey



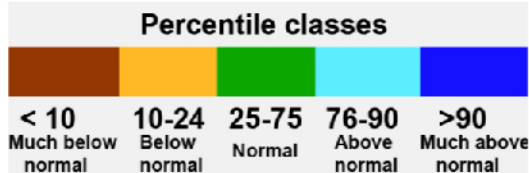
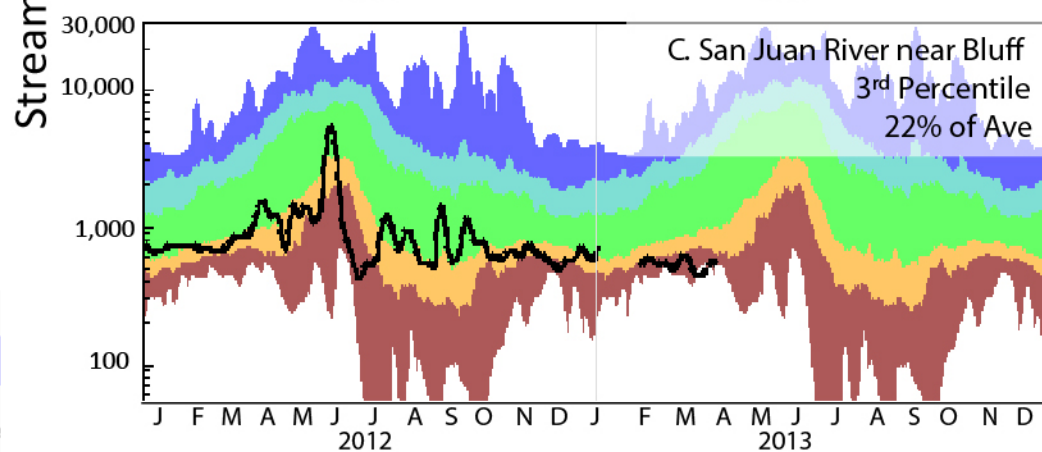
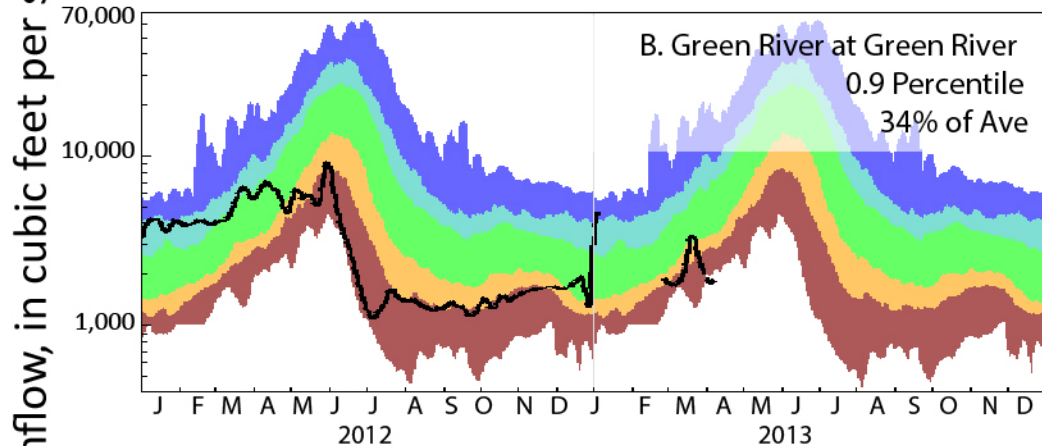
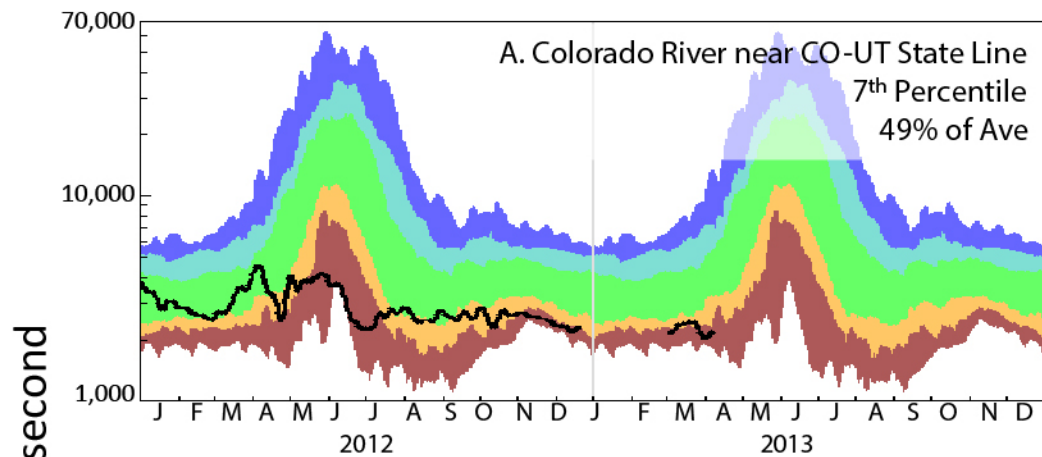
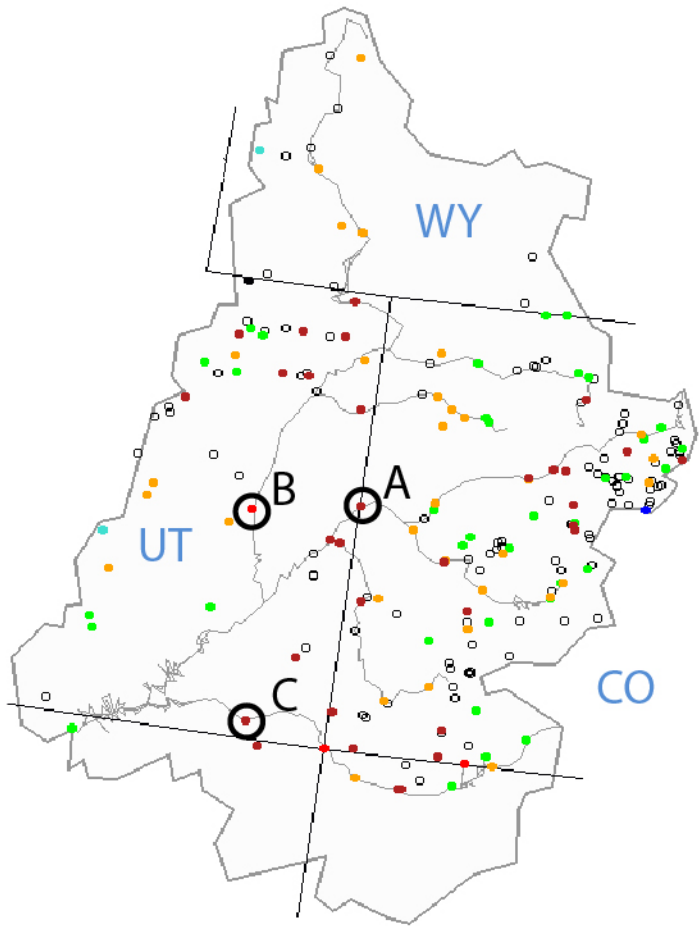
7 Day Average Streamflow Upper Colorado Basin April 7, 2013



Percentile classes						
1	2	3	4	5	6	7
Record Low	< 10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	Record High

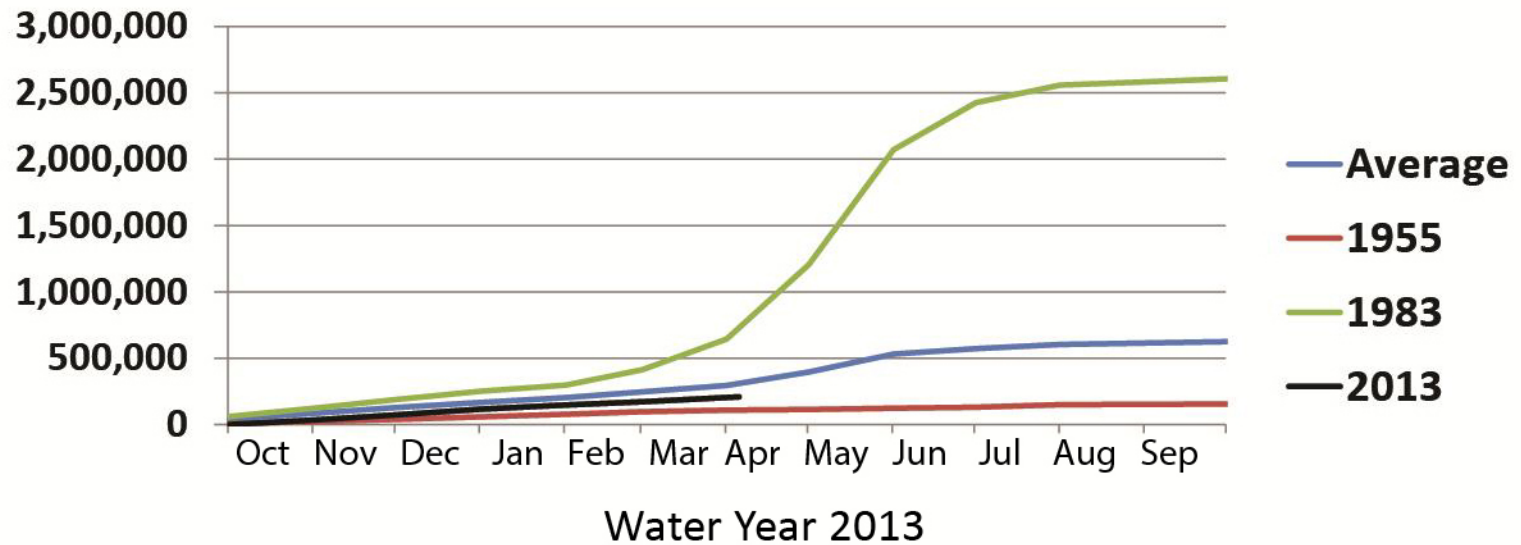
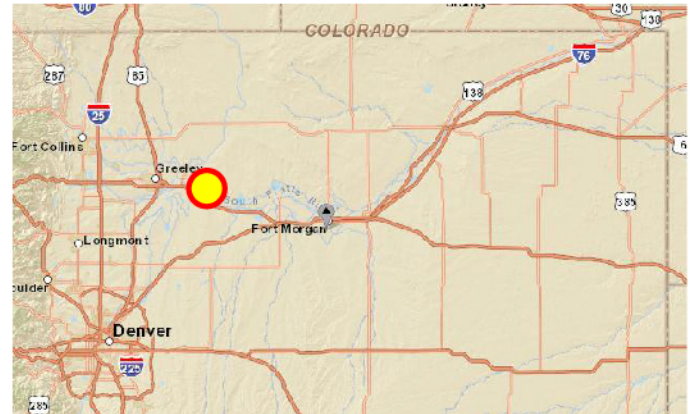


7 Day Average Streamflow Upper Colorado Basin April 7, 2013

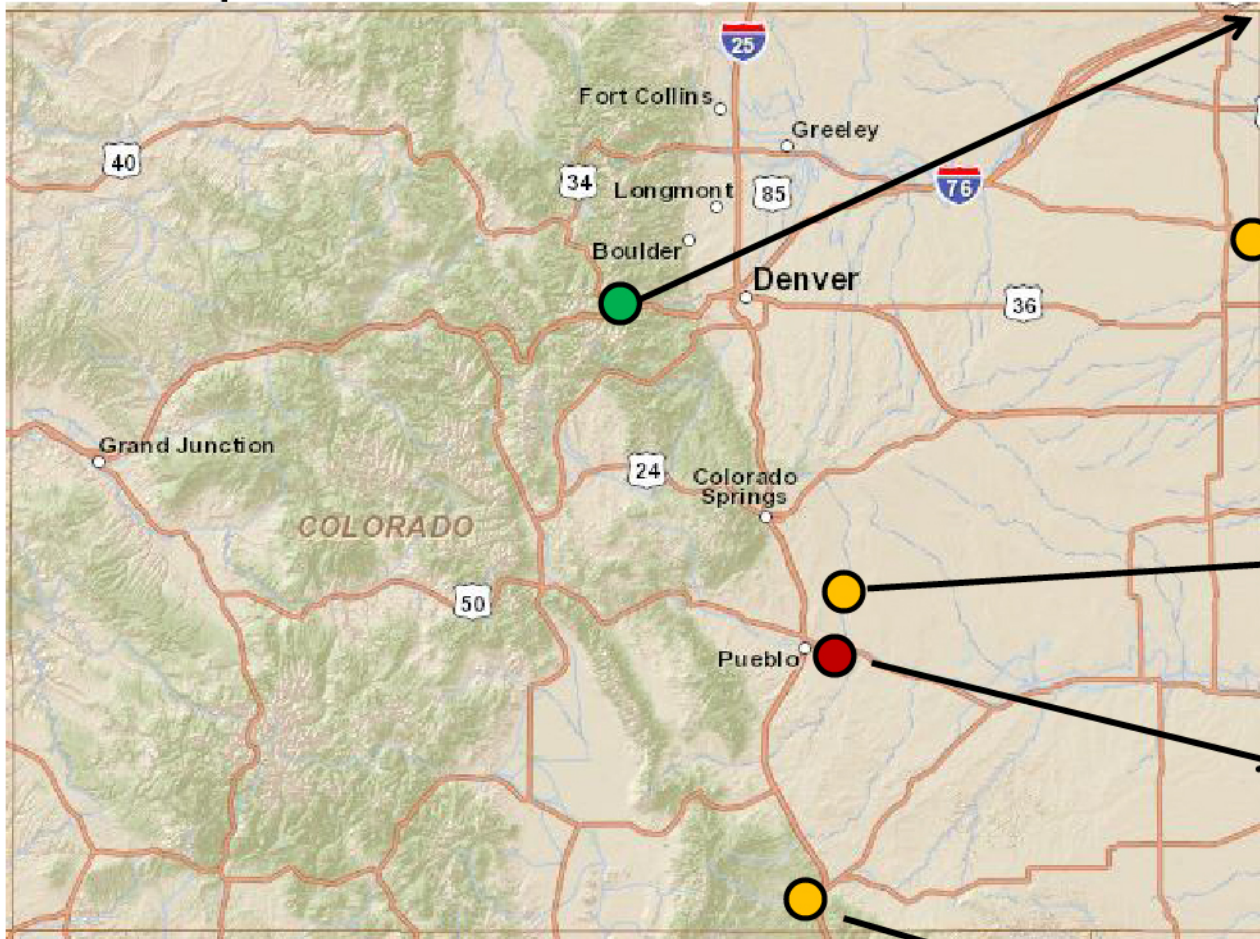


Cumulative Streamflow South Platte near Kersey

213,000 Ac-ft – April 8
About 70% of average



7 Day Average Streamflow Selected sites, Eastern CO April 7, 2013



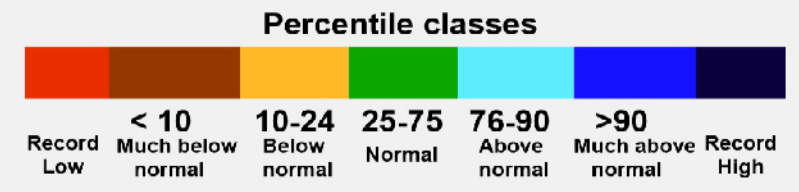
Clear Creek nr Lawson
26th Percentile
86% Average

N.F. Republican Stateline
17th Percentile
74% Average

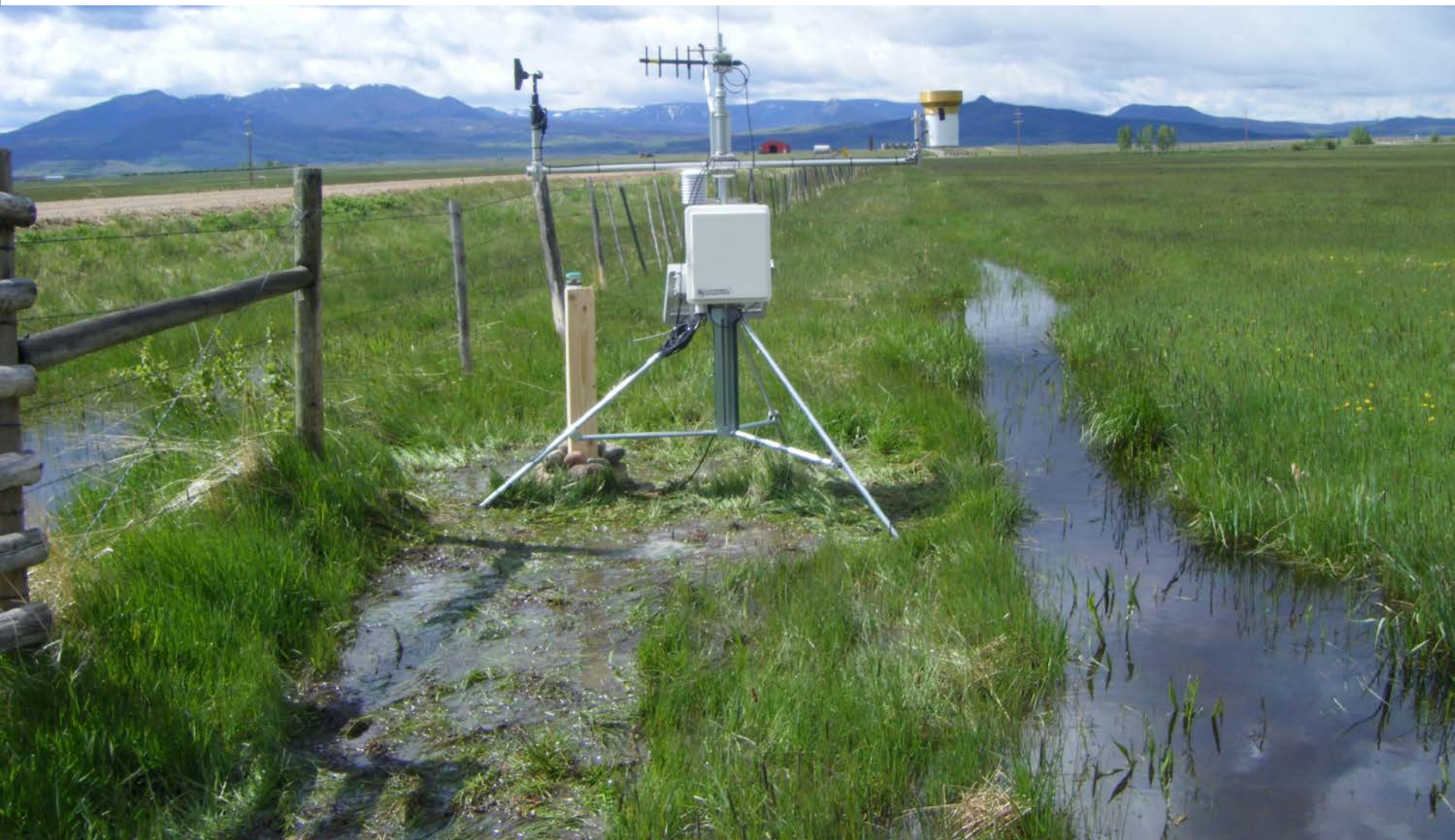
Fountain Cr nr Pinon
17th Percentile
49% Average

Arkansas nr Avondale
6th Percentile
38% Average

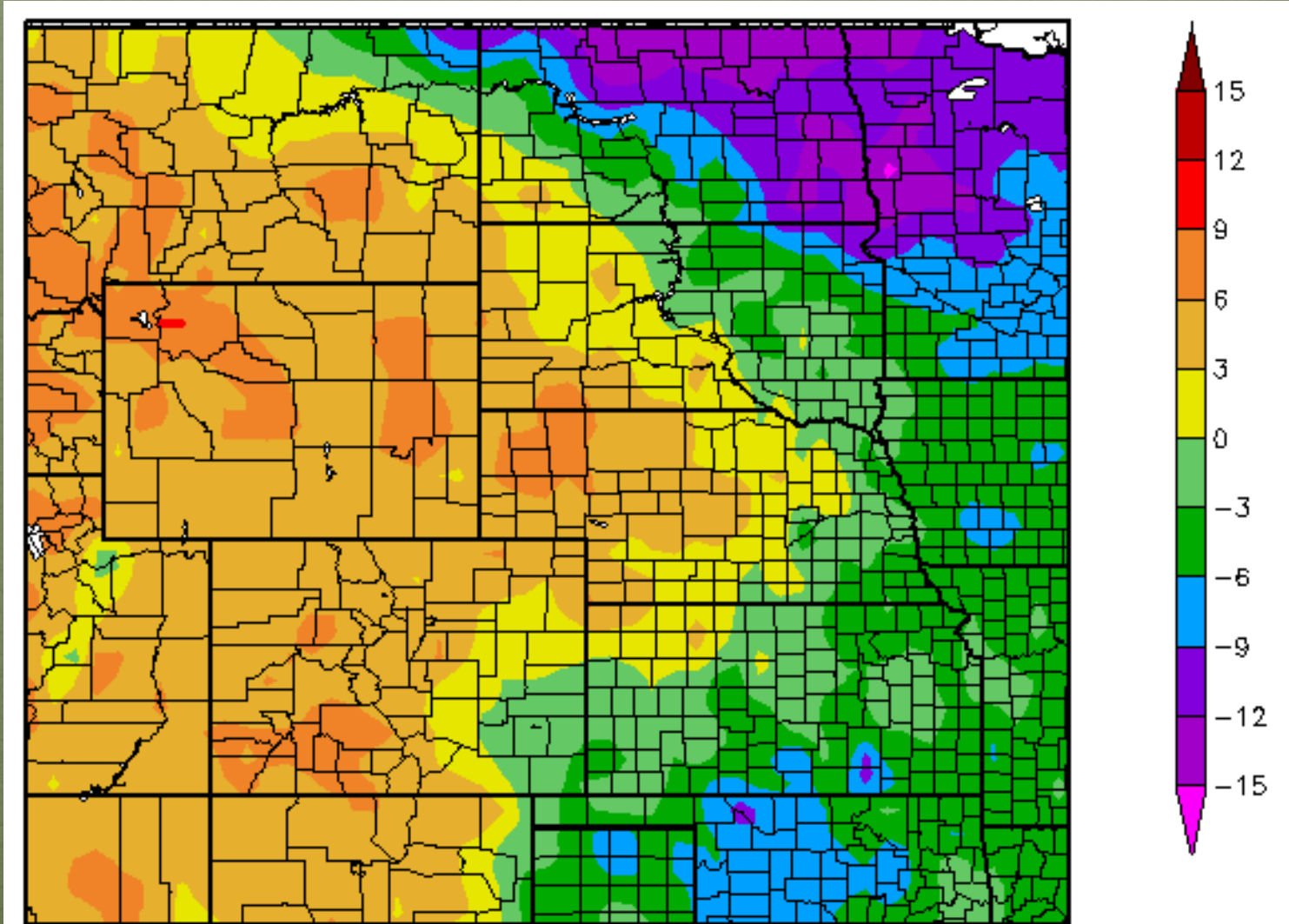
Purgatoire at Madrid
13th Percentile
39% Average



Water Demand

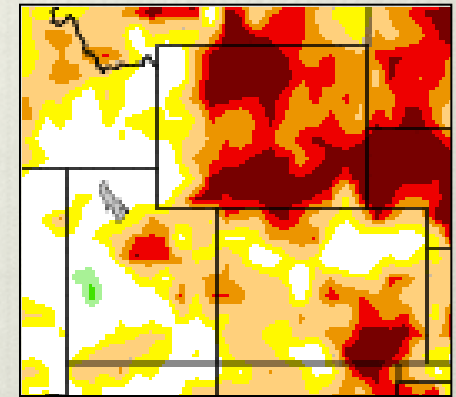
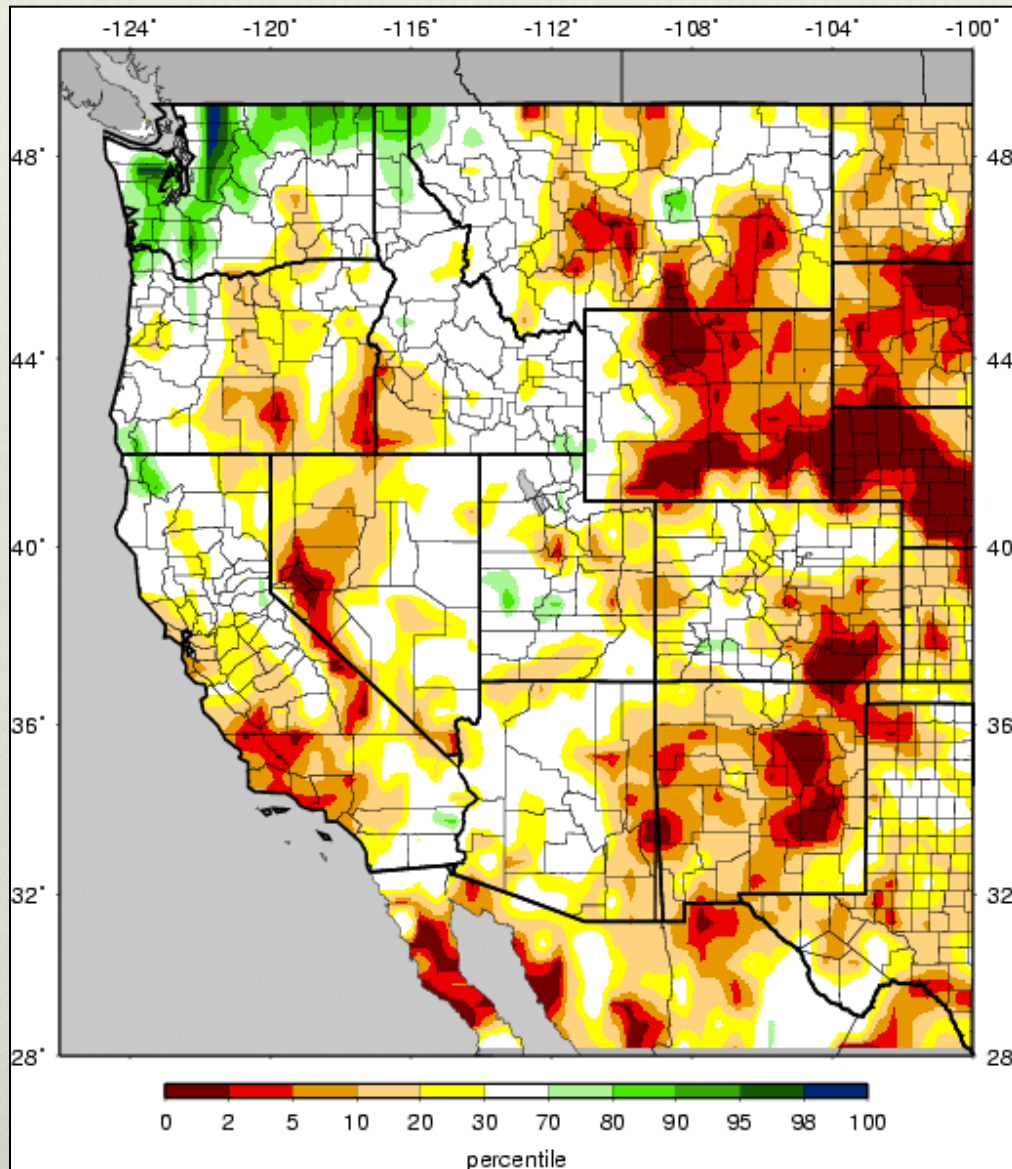


Temperature Departure from Normal 04/01/2013 – 04/07/2013



VIC Soil Moisture

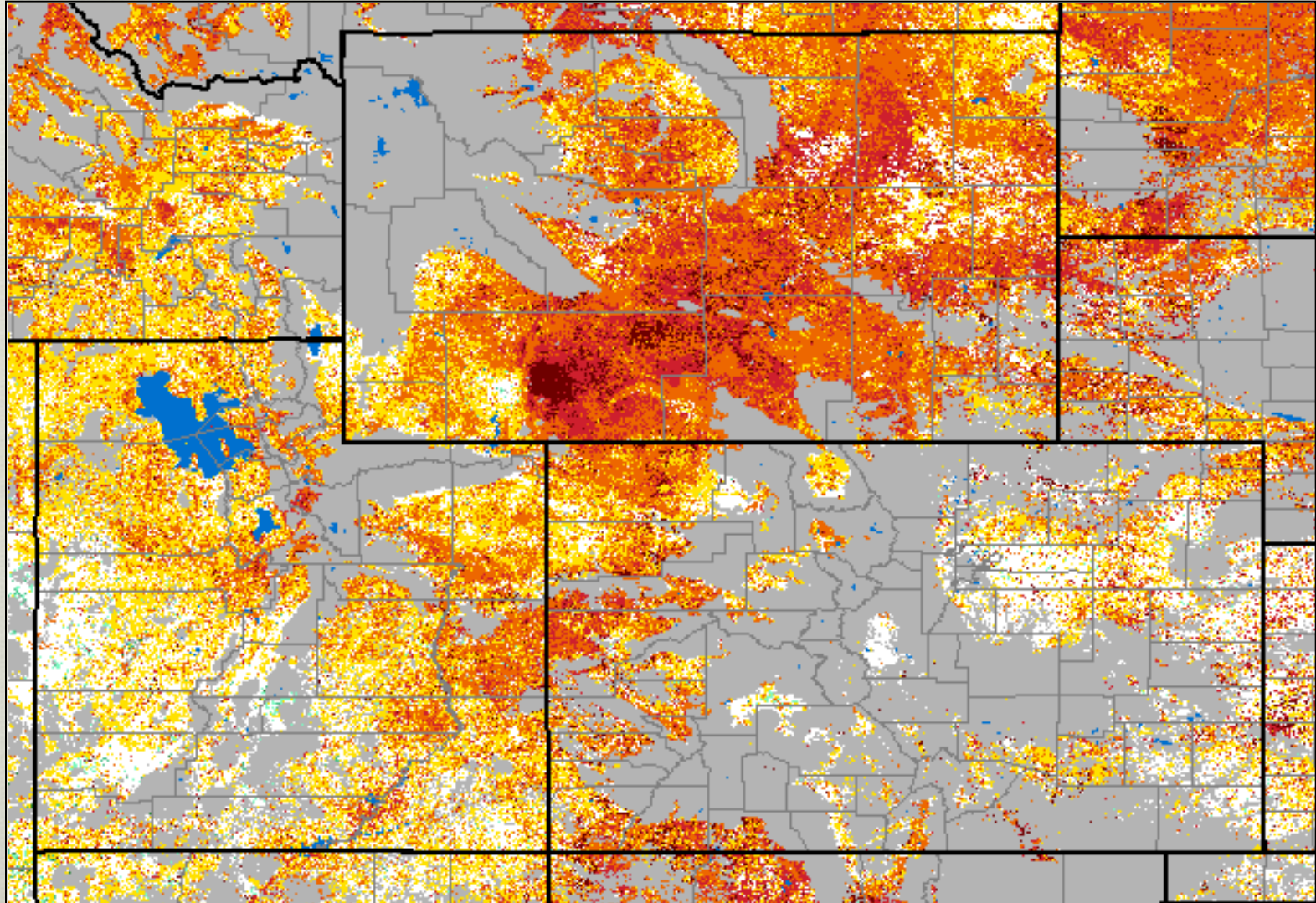
7 April 2013



VIC + SWE

VegDRI

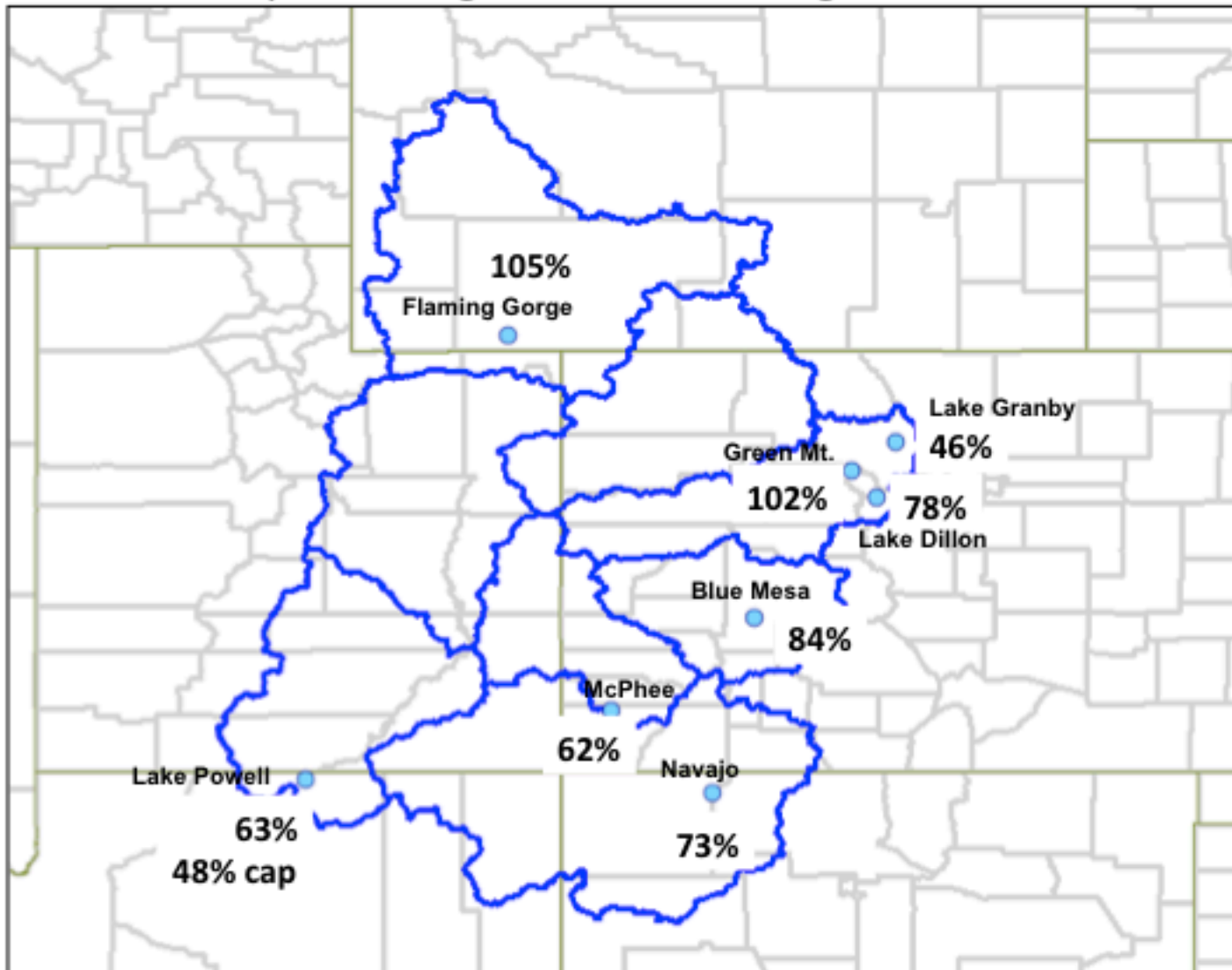
8 April 2013

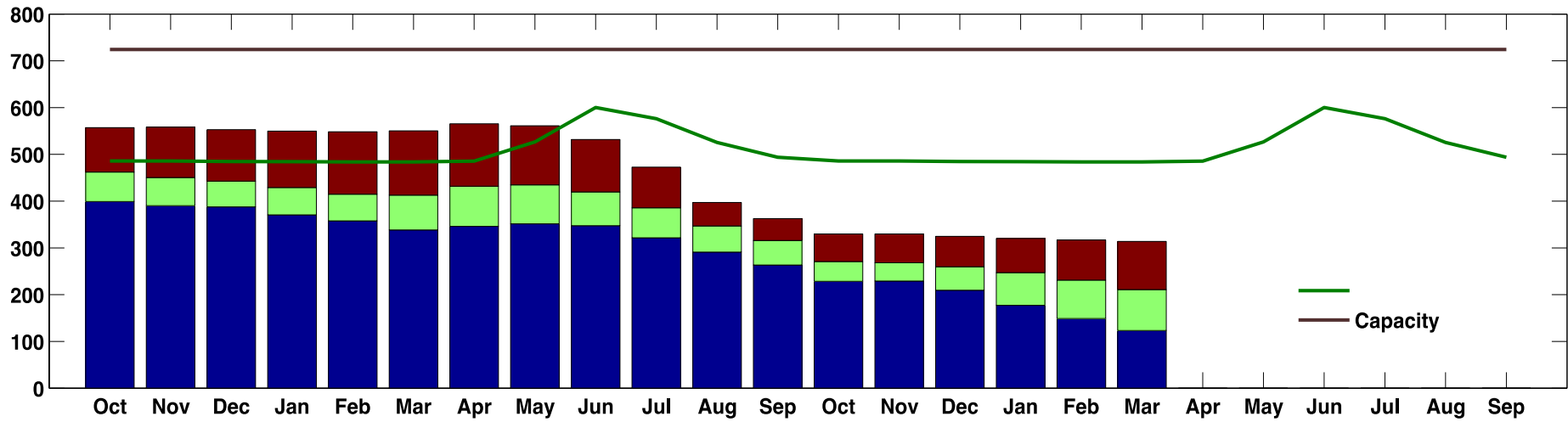


Reservoir Update

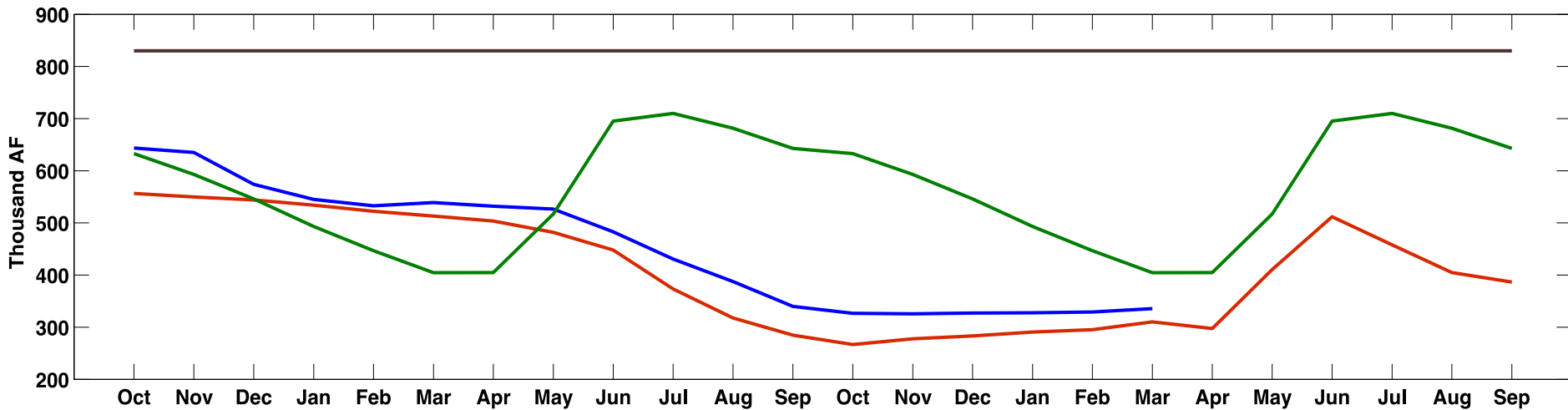


April Average Reservoir Storage Volume

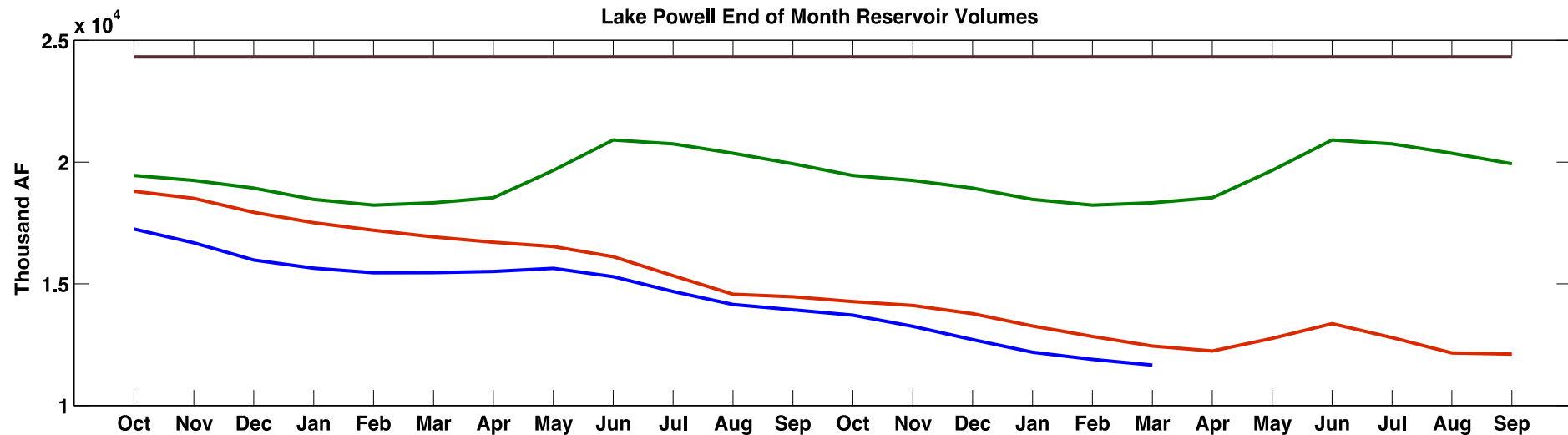




Blue Mesa End of Month Reservoir Volumes

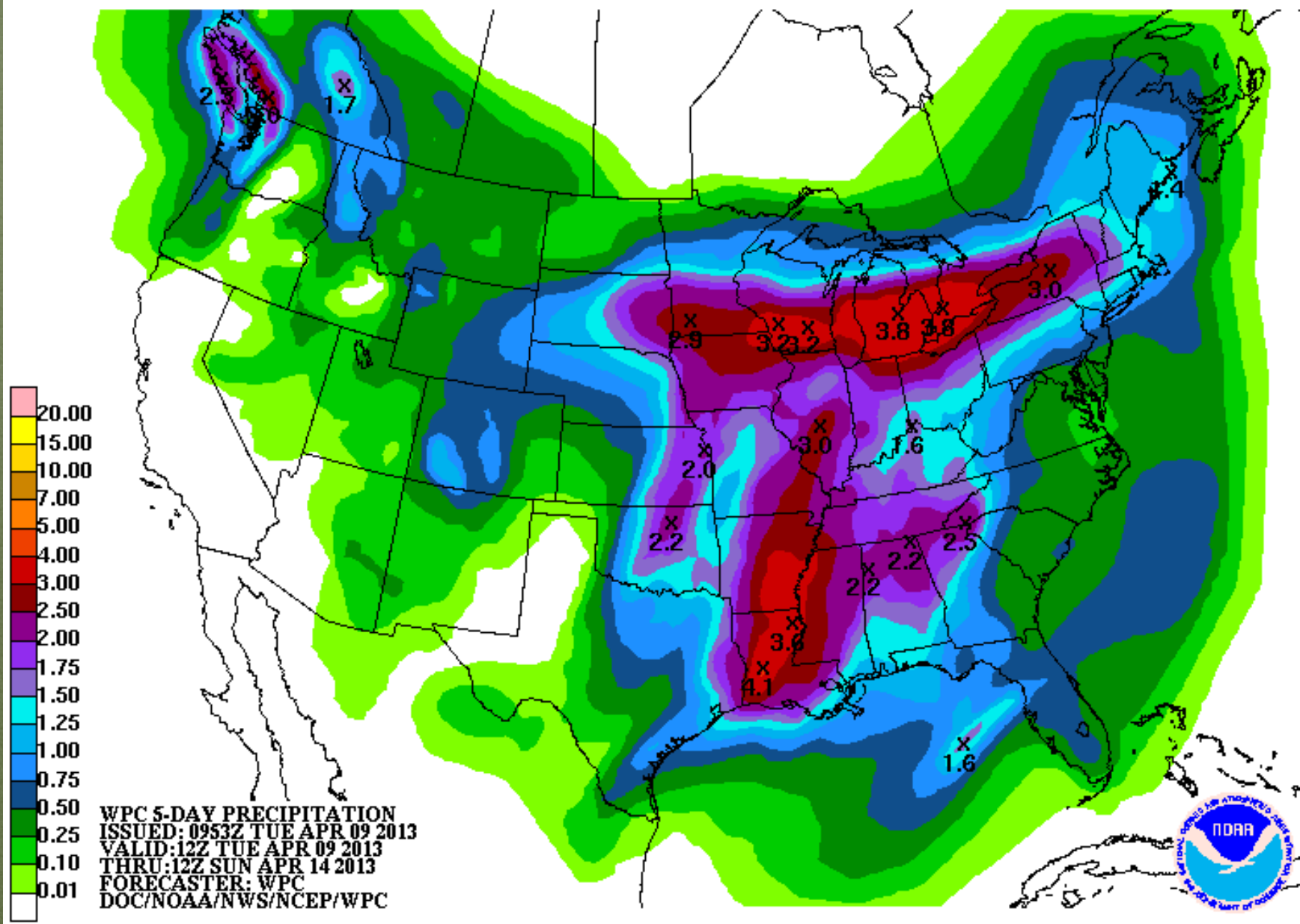


Lake Powell End of Month Reservoir Volumes



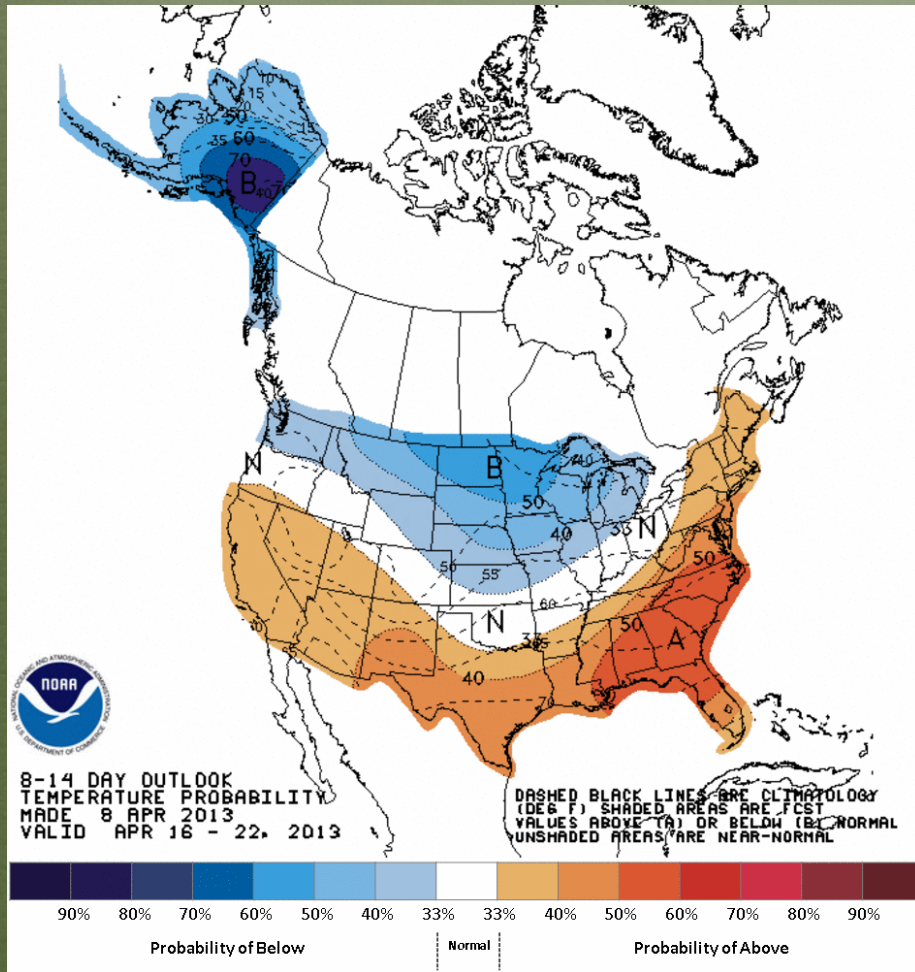
Precipitation Forecast



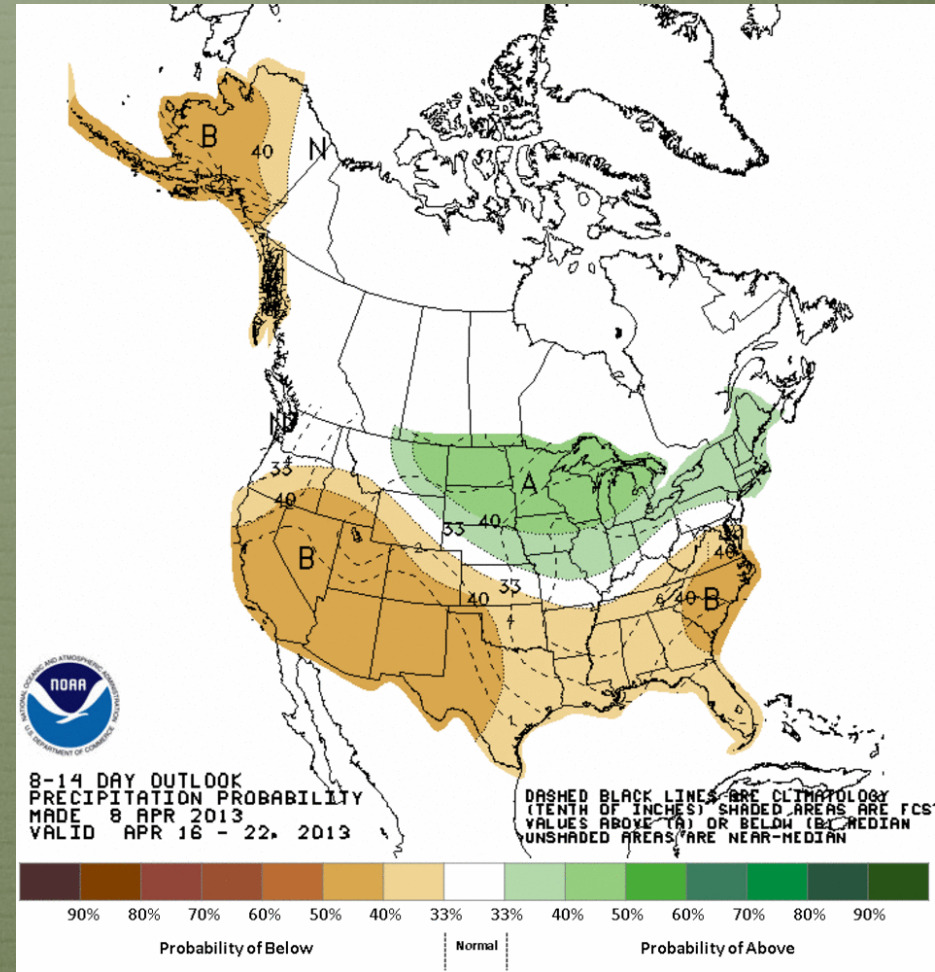


5-Day Quantitative Precipitation Forecast

8-14 Day Outlook

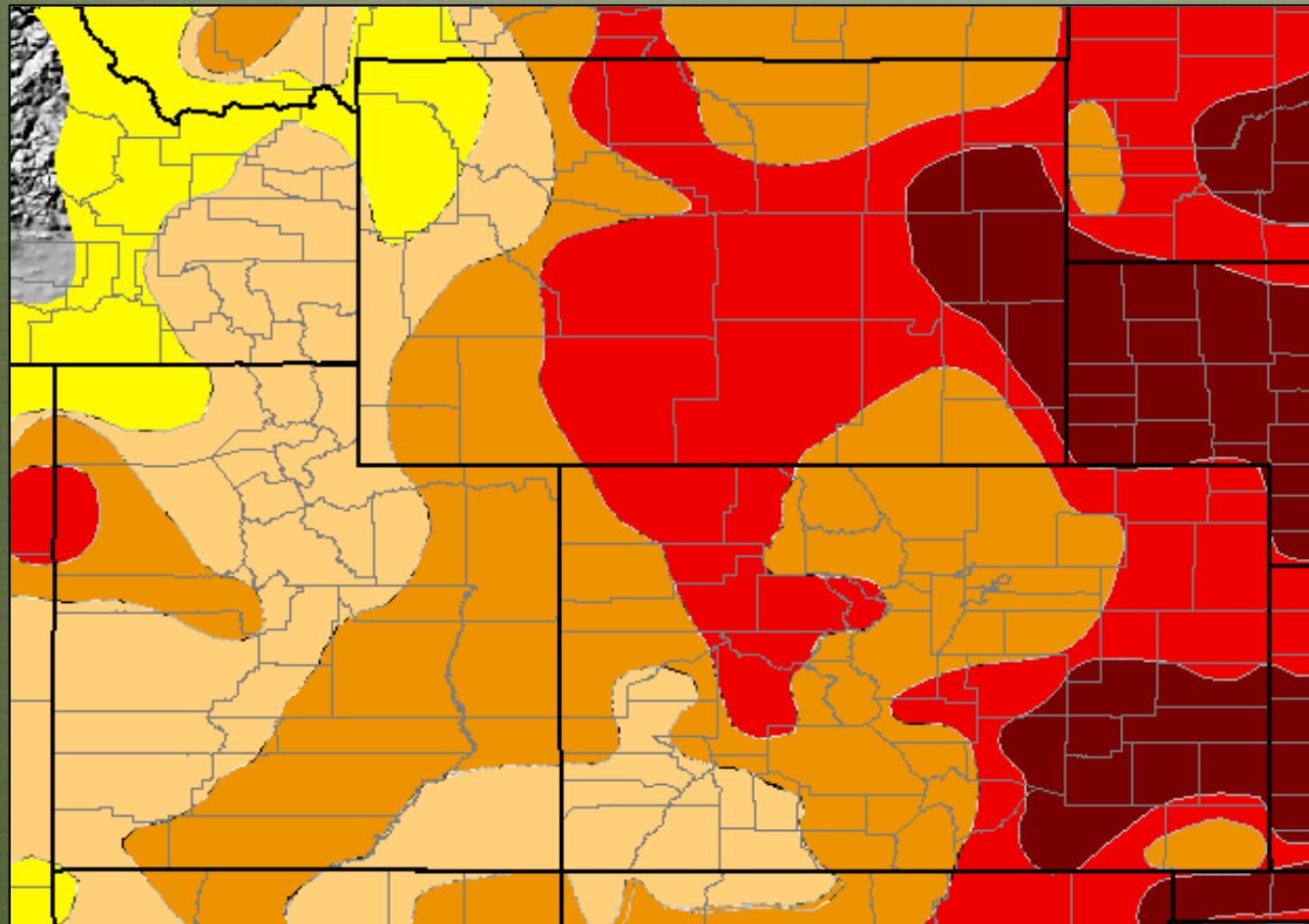


Temperature








Precipitation

Recommendations



Intensity:

-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

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CONTACT:

COLORADO CLIMATE CENTER

COLORADO STATE UNIVERSITY

FORT COLLINS, CO 80523

970 - 491 - 8545

NIDIS - UPPER COLORADO BASIN PILOT PROJECT

For more information

NIDIS Weekly Climate, Water and Drought Assessment Summary

Upper Colorado River Basin

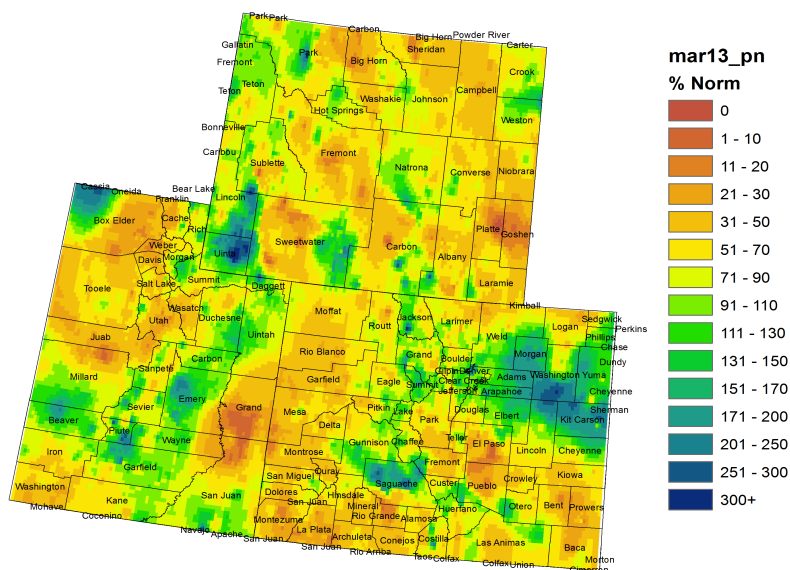
April 9, 2013

To be added to the mailing list, email: hreges@atmos.colostate.edu

View previous briefings: http://ccc.atmos.colostate.edu/drought_webinar.php

Register for the webinar: http://ccc.atmos.colostate.edu/drought_webinar_registration.php

Colorado, Utah and Wyoming March 2013 Precipitation as Percentage of Normal



Colorado, Utah and Wyoming 7 Day Precipitation (in) 1 - 7 April 2013

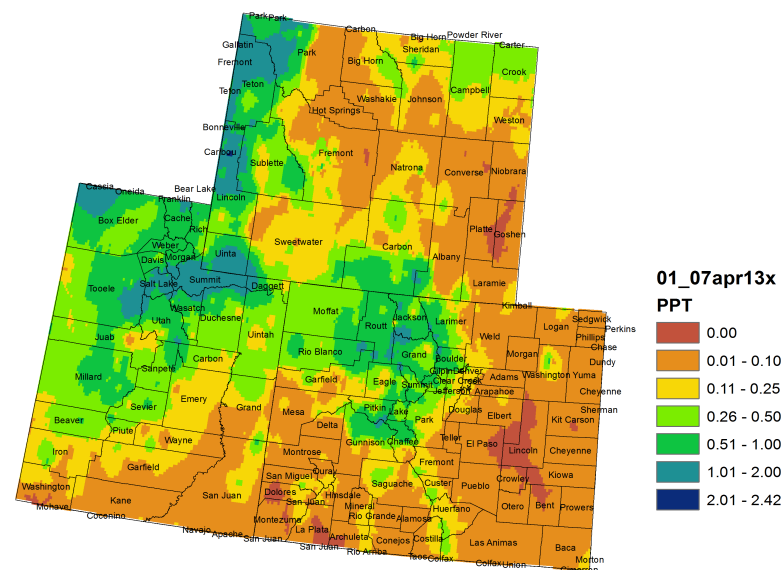


Fig. 1: March precipitation as a percent of average.

Fig. 2: April 1 – 7 precipitation in inches.

Precipitation

Last month, the majority of the Upper Colorado River Basin (UCRB) received below average precipitation (Fig. 1). Some areas of southwest Wyoming, eastern Utah and the northern and central Colorado mountains received near to slightly above average precipitation for the month of March. Sweetwater County, WY, western CO and the Colorado River valley in eastern UT were much drier, receiving less than 50% of average precipitation for the month. East of the basin, parts of the CO Front Range and northeast CO received above average precipitation while far northern CO and most of the Arkansas valley received below average precipitation last month.

Last week, the southern part of the UCRB was drier and the northern part of the basin was slightly wetter (Fig. 2). Parts of northern UT and western WY received over 1 inch of moisture, while most of the higher elevations in the northern UCRB received between .25 and 1 inch. The southern UCRB received less than .10 inches of precipitation for the week. East of the basin, most of eastern CO also received less than .10 inches last week, though the foothills and higher elevations approaching the Continental Divide received up to .50 inches.

Snotel Water Year Precipitation Percentile Ranking for 8 April 2013 (Stations with 15+ years of data only)

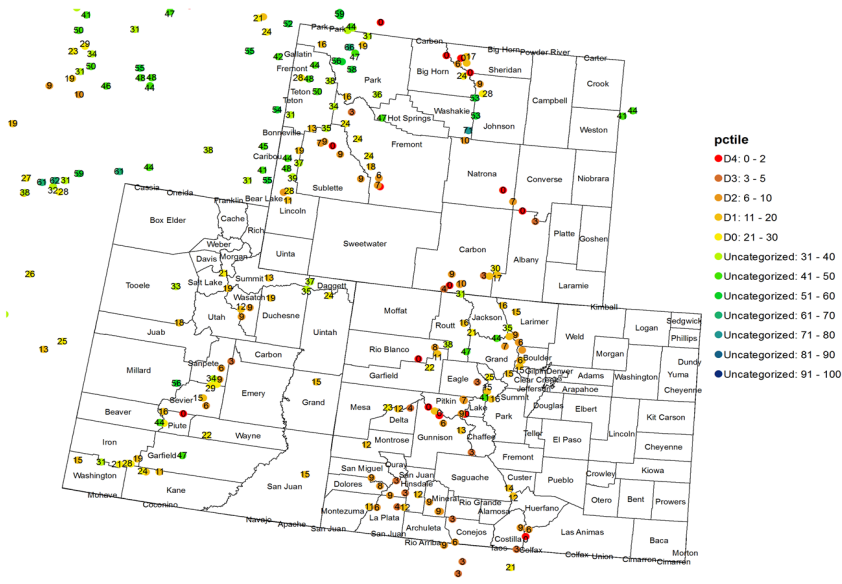


Fig. 3: WYTD SNOTEL precipitation percentiles (50th percentile is median, 30th percentile is D0 drought category) as of April 8th.

Snowpack

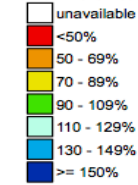
Water-year-to-date SNOTEL precipitation percentiles in the UCRB are below the median throughout the entire basin (Fig. 3). Along the Wasatch and Uintah ranges in UT and up to the Upper Green in WY, most percentiles range from the teens to 30s, with a few that are now recording below the 10th percentile. The northern and central CO mountains are below the 20th percentile at most locations, with several sites recording below the 5th percentile. Percentile rankings in southwest CO in the San Juan mountains are mostly in the teens and single digits.

Accumulated snowpack is currently less than normal across the entire UCRB (Fig. 4), and most of the sub-basins saw large decreases in percents of normal over the past week. Sub-basin snowpack in western CO ranges between 65% and 75% of normal. Sub-basins throughout UT are less than 70% of normal while snowpack in the sub-basins of southwest WY are mostly over 75% of normal.

Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Apr 08, 2013

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median



* Data unavailable at time of posting or measurement is not representative at this time of year

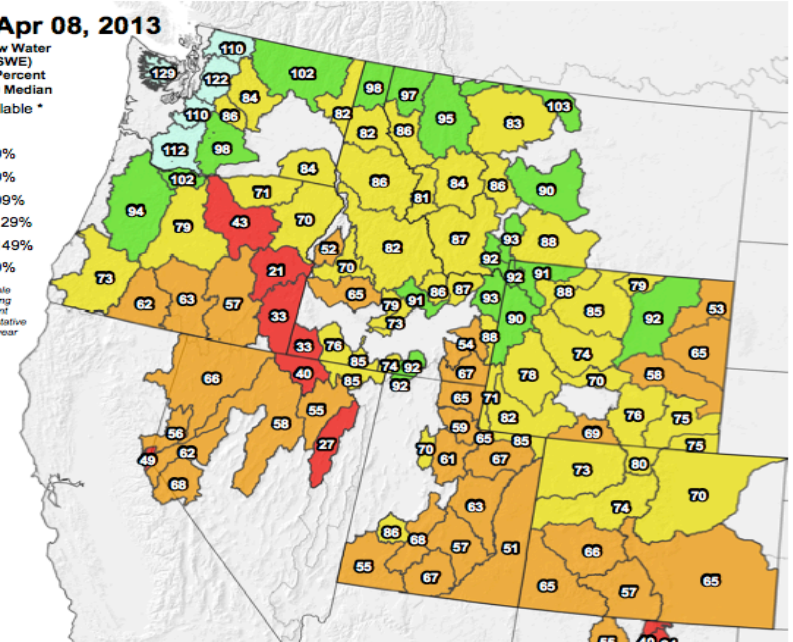
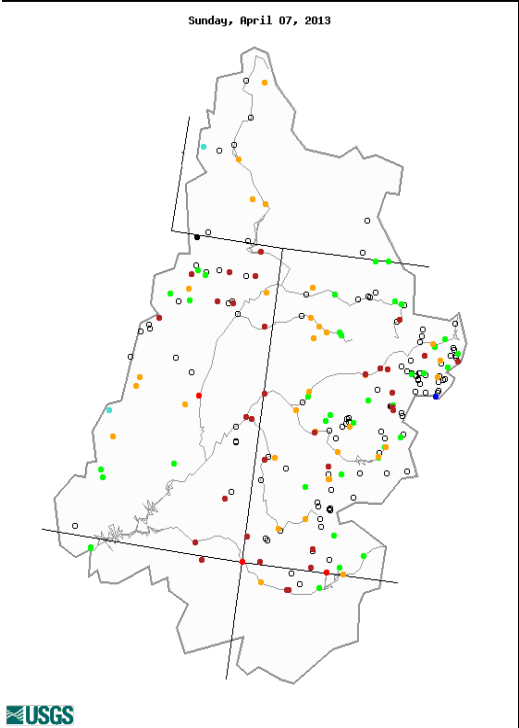


Fig. 4: Basin-averagd snow water equivalent as a percent of normal (median), as of April 8th.

Streamflow

As of April 7th, about 38% of the USGS streamgages in the UCRB recorded normal (25th – 75th percentile) to above normal 7-day average streamflows (Fig. 5), an increase from 21% last week. This increase is likely due to warmer temperatures and melting snow. About 32% percent of the gages in the basin are recording much below normal or low (i.e. lowest on record) streamflows. Lower flows are mostly the result of prolonged drought, though temperature departures can largely dictate increased/decreased flows during this time of year. 109 gages are now reporting again, an increase from 64 gages one month ago.

Flows on the three key gages around the basin continue to see very low flows (Fig. 6). Flows on the Colorado River near the CO-UT state line increased this last week (from the 3rd to 7th percentile) and are still in the much below normal range. The Green River at Green River, UT has recorded a new record low flow for the latest 7-day period (at the 1st percentile now) after a large drop in flows. The San Juan River near Bluff, UT is reporting much below normal flows at the 3rd percentile.



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		

Fig. 5: 7-day average discharge compared to historical discharge for April 7th.

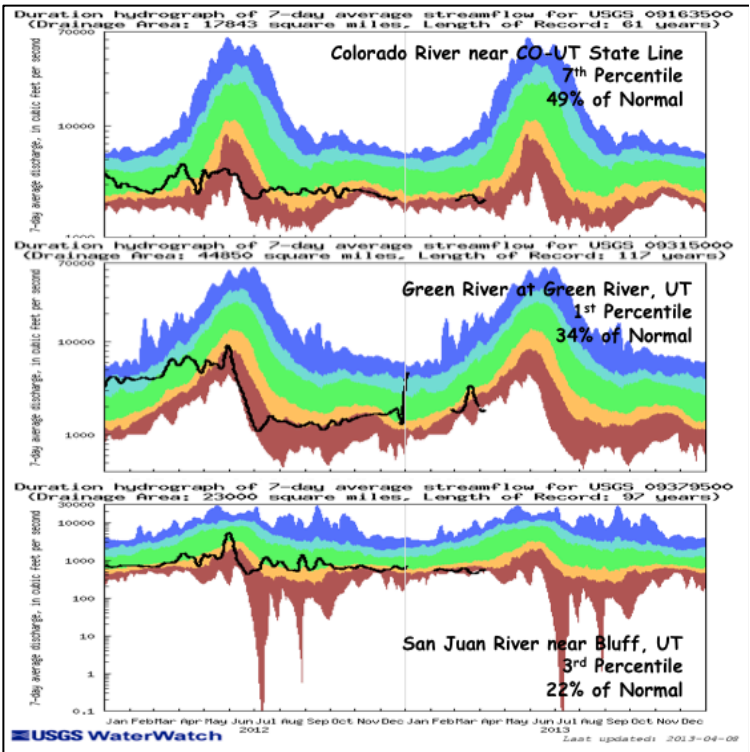


Fig. 6: USGS 7-day average discharge over time at the CO-UT stateline (top), Green River, UT (middle) and Bluff, UT (bottom).

Water Supply and Demand

Last week, the UCRB experienced temperatures warmer than average temperatures, ranging from 3 to 9 degrees above average. East of the basin, northeast CO saw warmer than average temperatures while southeast CO experienced near average to cooler than average temperatures. The VIC soil moisture model continues to show dry soils through most of WY with near normal soil moisture in western WY (Fig. 7). The VIC model is being largely controlled by temperature changes for much of the basin and has shown improved soil moisture conditions over the last week (due to warmer temperatures causing melting and infiltration). When SWE is combined with soil moisture, much lower percentiles show up for western CO and northeast UT (Fig. 7). Dry soils below the 10th percentile show up over most of southeastern CO.

Last month, most of the major reservoirs in the UCRB saw volume decreases. Flaming Gorge and Blue Mesa saw slight volume increases, while Green Mountain has begun to see volume increases in the past couple of weeks. Lake Granby decreased by a larger percent than what is normal. For the month of April, Flaming Gorge and Green Mountain are near average while the remaining reservoirs are all below average, ranging from 46% of average (Lake Granby) to 84% of average (Blue Mesa).

Precipitation Forecast

A deep upper level low pressure system is currently situated over the UCRB with moist southwest flow providing fuel for light to moderate snow showers over portions of the basin. This storm will gradually shift to the north and east throughout the day and continue to generate accumulating snowfall in the mountain ranges of southwestern CO. Expect favored locals in the San Juans to approach an inch of liquid accumulation through Wednesday, with lesser amounts of 0.10 to 0.25 inches further north and west (Fig. 8). The pattern will remain active as a number of fast moving systems traverses the region during the work week. While none of the individual features will produce significant precipitation, an additional 0.10 inches of liquid may accumulate over high mountain areas through the end of the week. A slightly better chance of accumulating snowfall will arrive sometime late this weekend, favoring the central CO mountains.

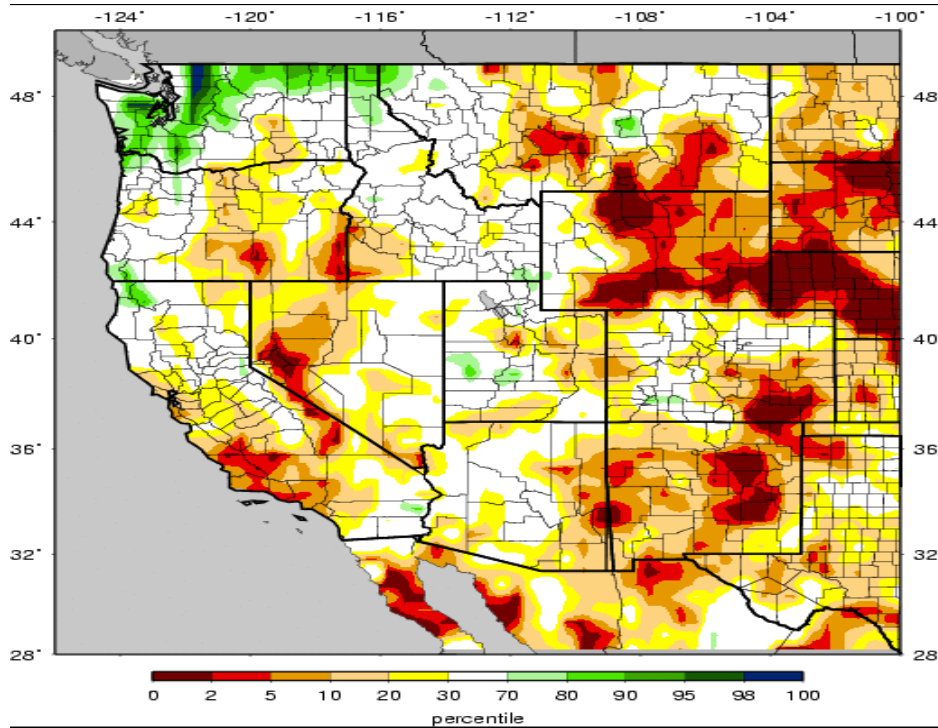


Fig. 7: VIC modeled soil moisture percentiles for the western U.S. as of April 7th. The map below combines soil moisture and SWE.

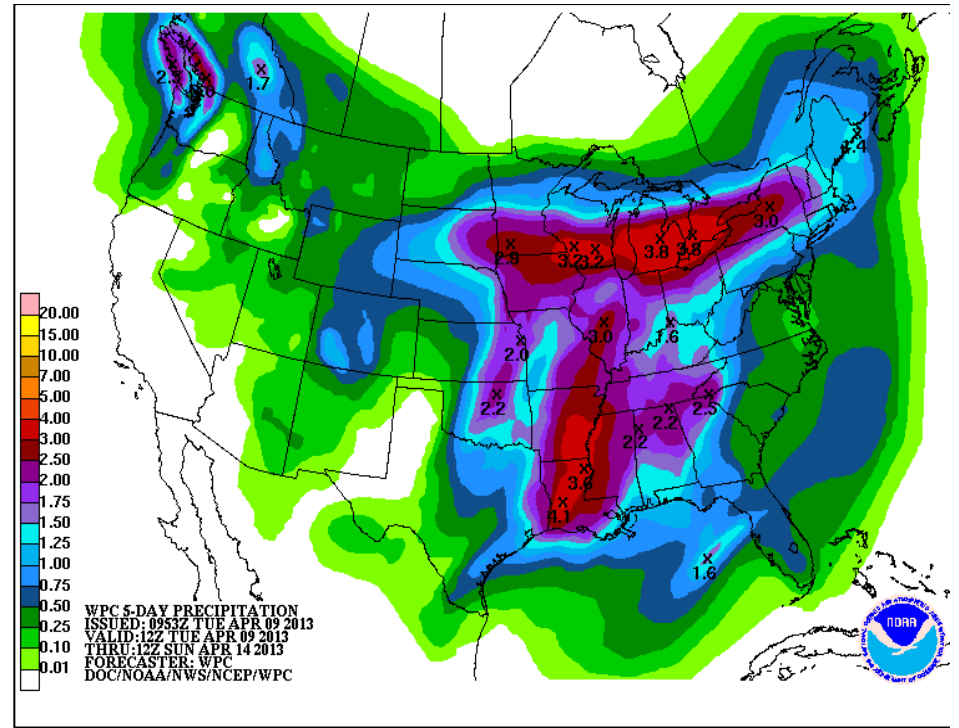
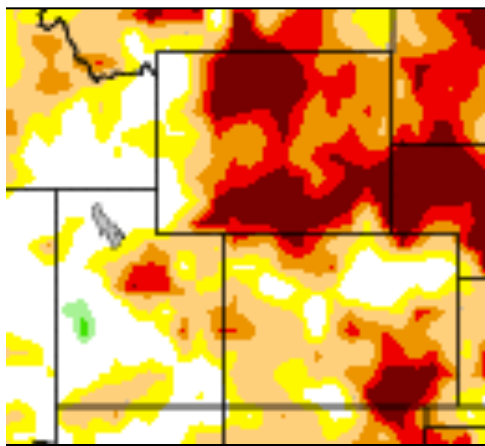


Fig. 8: Quantitative precipitation forecast (QPF) by the Hydrologic Prediction Center out to 12UTC Sunday.

Drought and Water Discussion

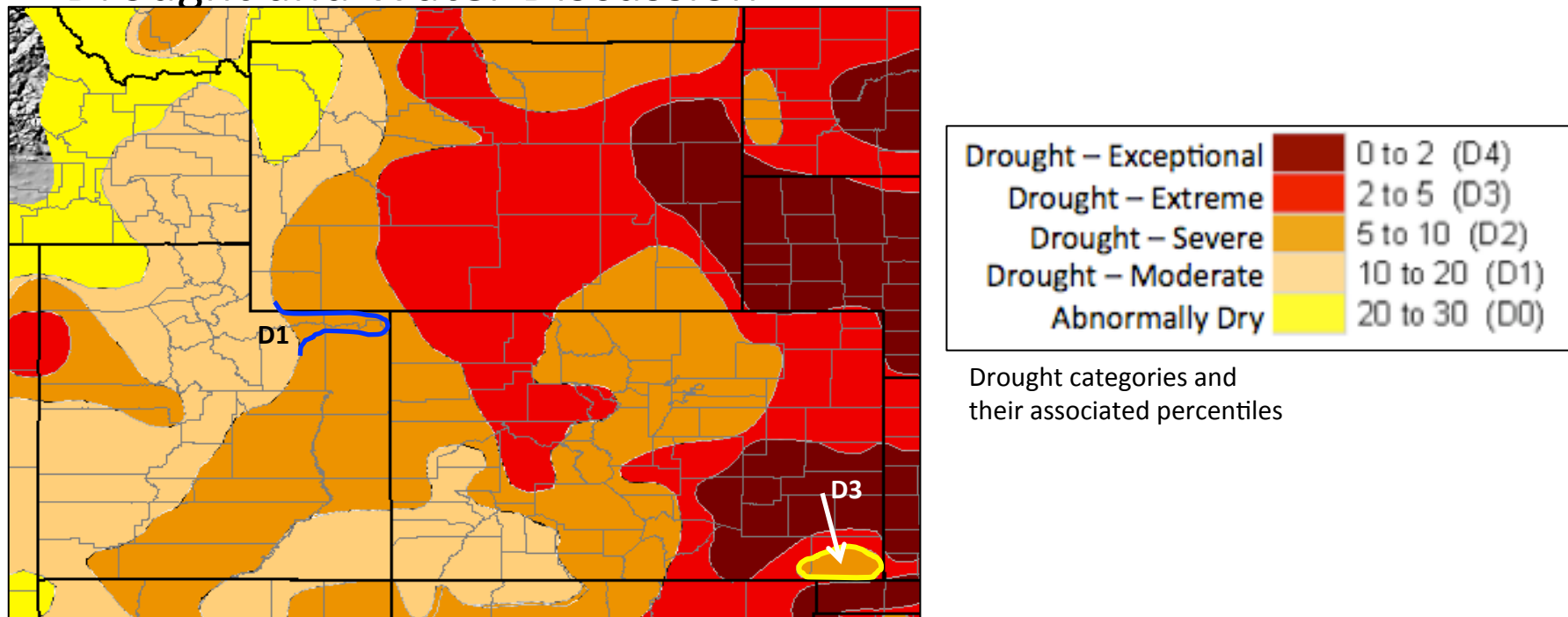


Fig. 9: April 2nd release of U.S. Drought Monitor for the UCRB.

UCRB: One slight improvement is recommended for the UCRB in the current depiction of the U.S. Drought Monitor (USDM) map (Fig. 9, blue line). The Uintahs have seen above average precipitation over the past month and is near average for the water year, so the area should be improved to D1. Status quo is recommended for the rest of the basin. Southwest CO is being monitored for possible degradations. The snowpack in the southern mountains has begun rapidly melting and was well below average at its peak. However, it is currently snowing in the region and that may help conditions. It is recommended to wait a week before deciding on changes in the area when it is more clear how beneficial the snow was, and if dust on snow was a major issue.

Eastern CO: It is recommended that the isolated D2 in Baca County be downgraded to D3 (Fig. 9, yellow outline). The area is currently very dry and has experienced poor winter wheat conditions. Status quo is recommended for the rest of eastern CO.