

**Spring
2012**



May 22nd, 2012

NIDIS - UPPER COLORADO BASIN PILOT PROJECT

Weekly Climate, Water & Drought Assessment

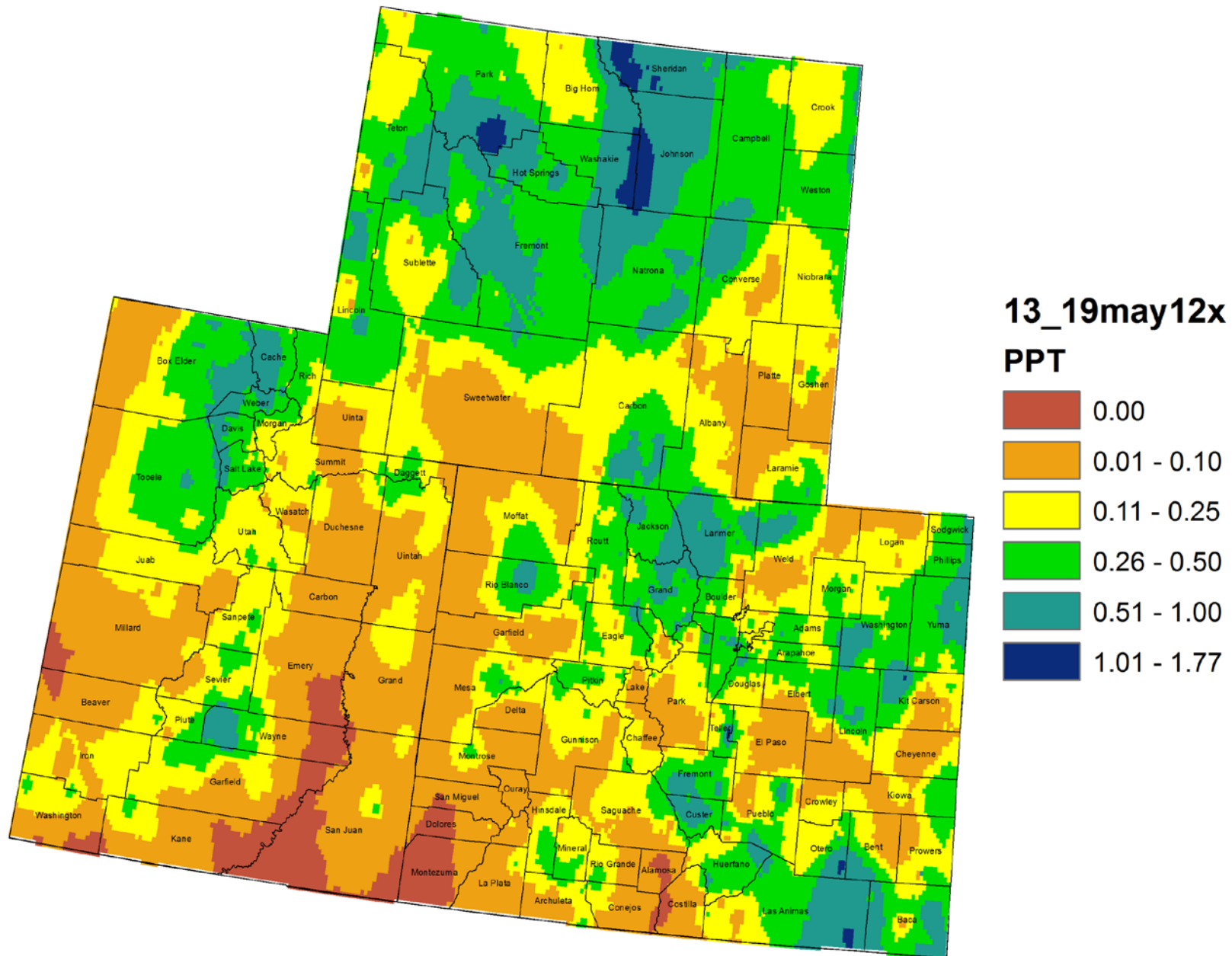
Today's Agenda

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

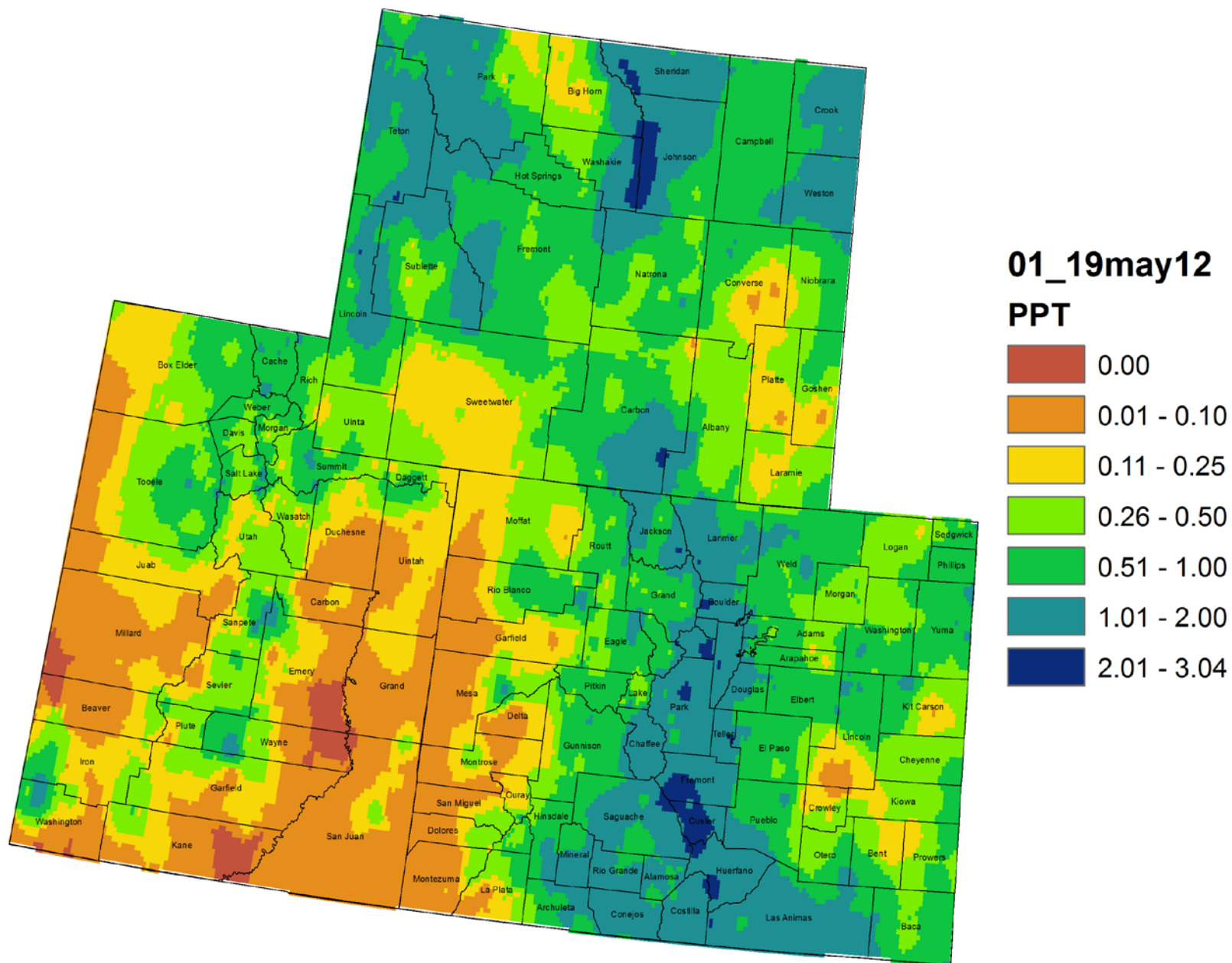
Precipitation/Snowpack Update



Colorado, Utah and Wyoming 7 Day Precipitation (in) 13 - 19 May 2012

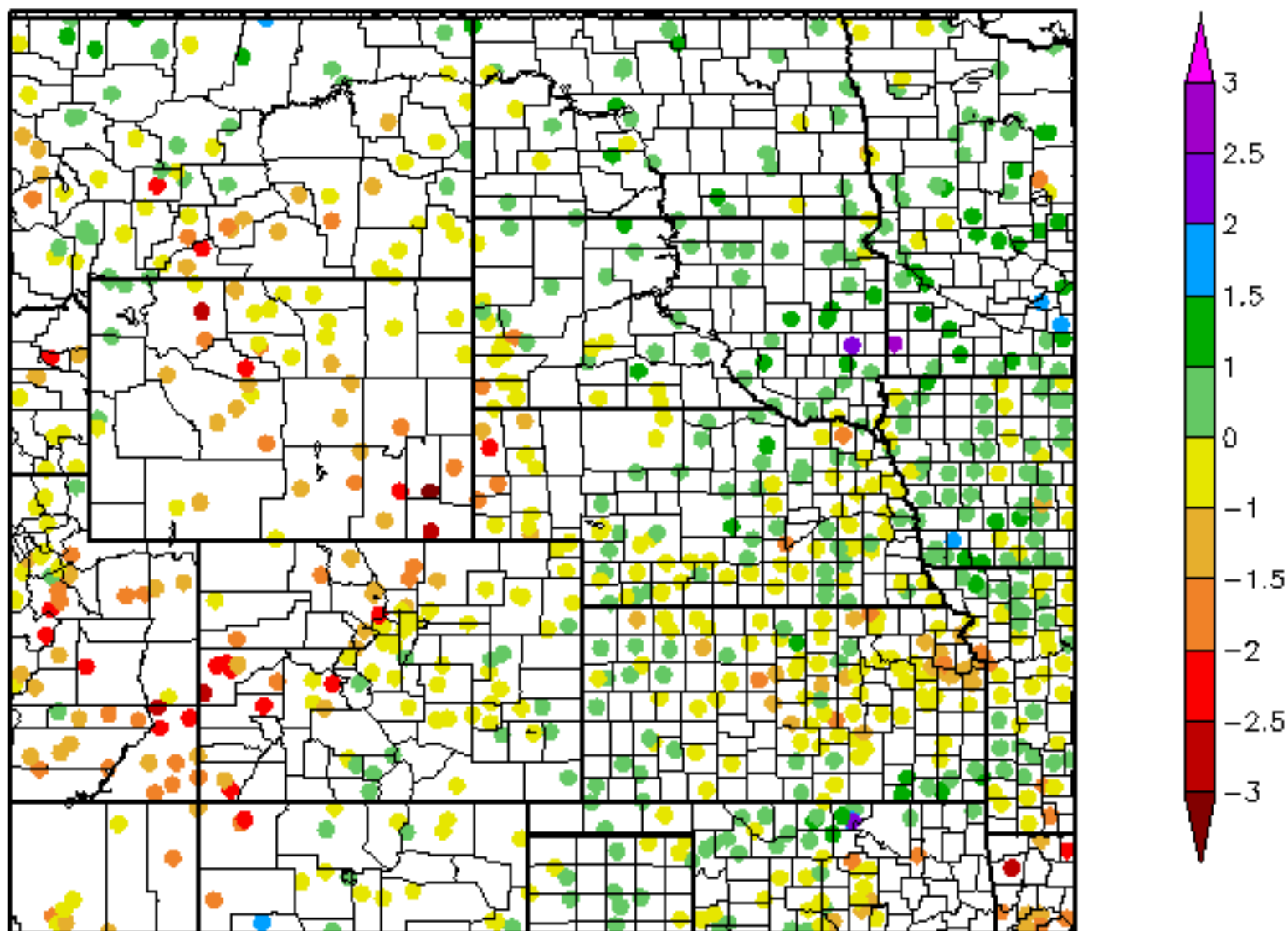


Colorado, Utah and Wyoming Month to Date Precipitation (in) 1 - 19 May 2012

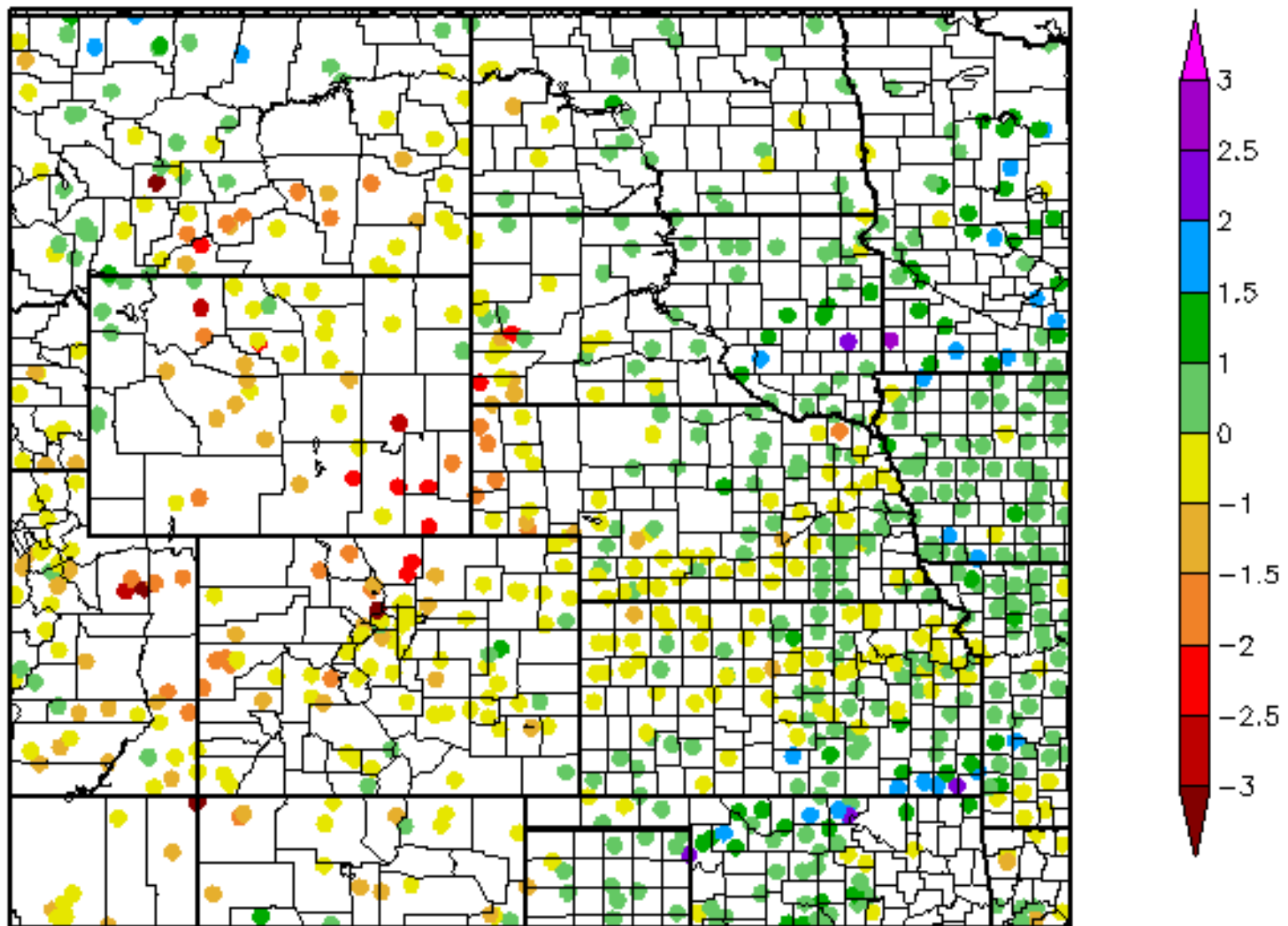


60 Day SPI

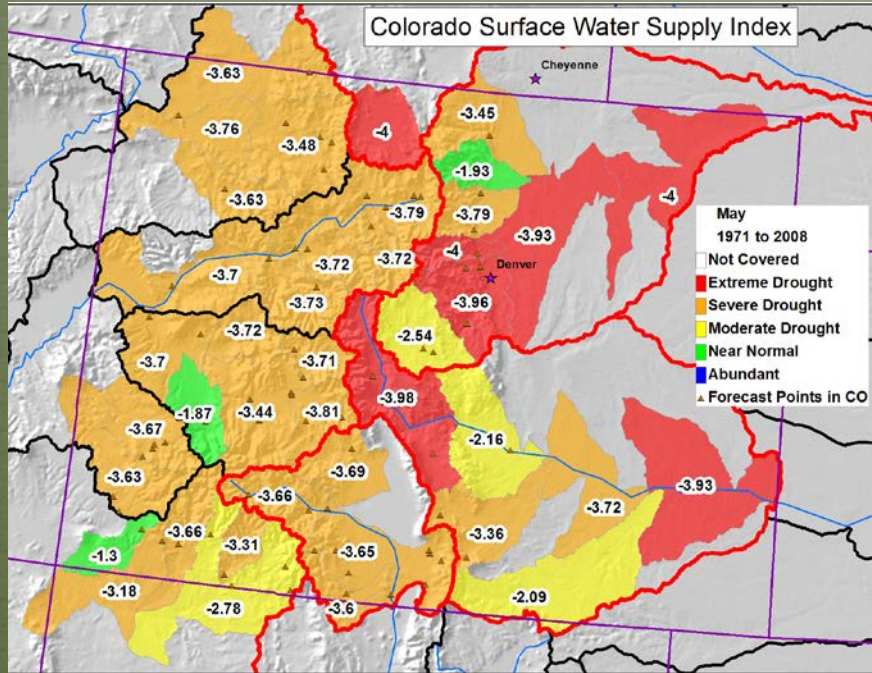
3/23/2012 - 5/21/2012



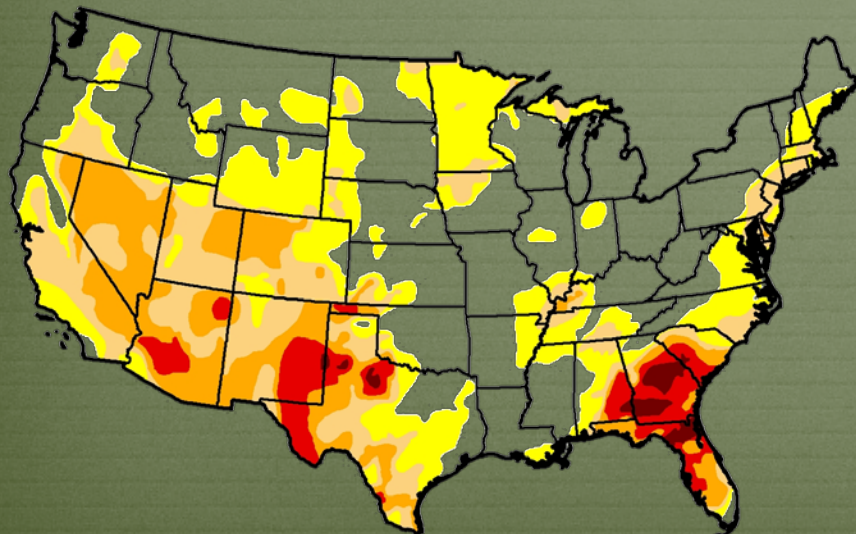
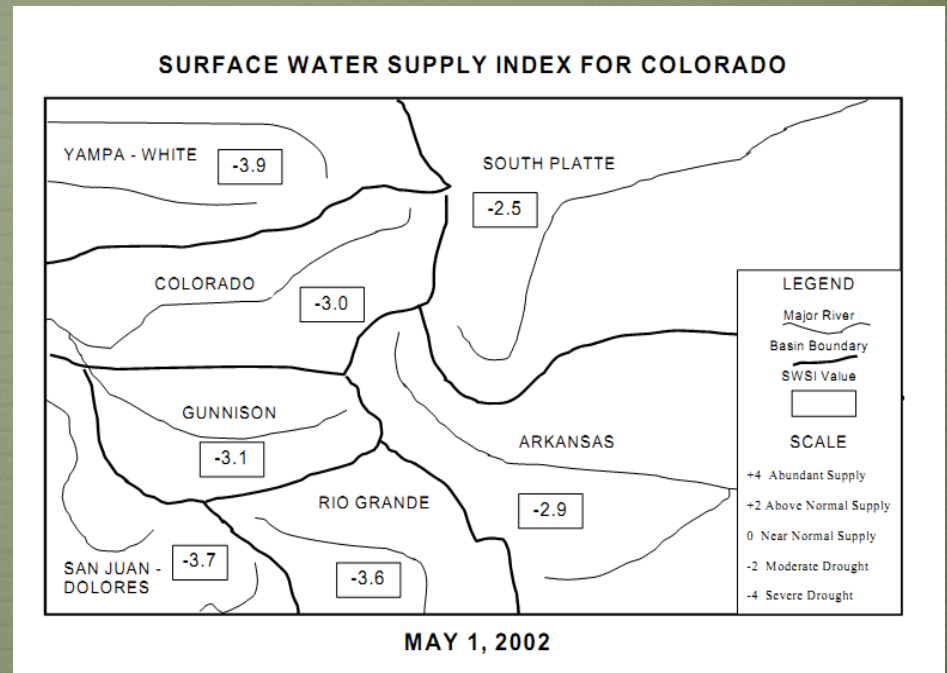
120 Day SPI
1/23/2012 - 5/21/2012



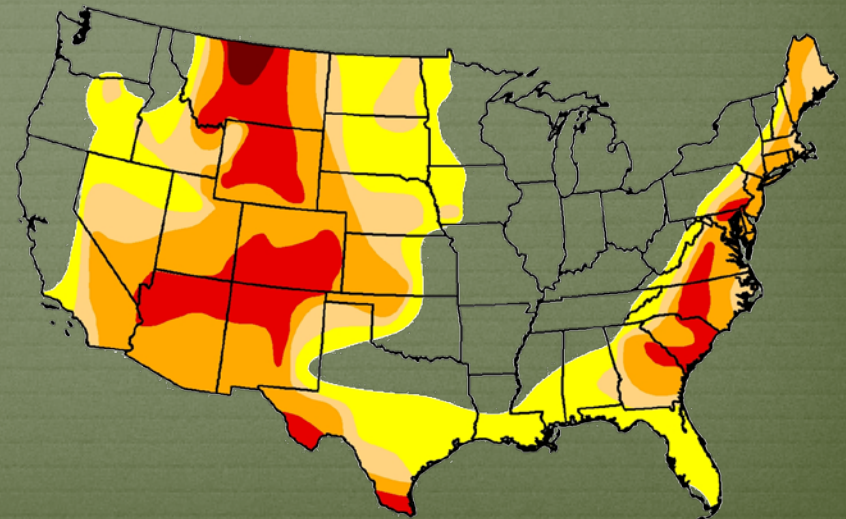
SWSI May 1, 2012



SWSI May 1, 2002

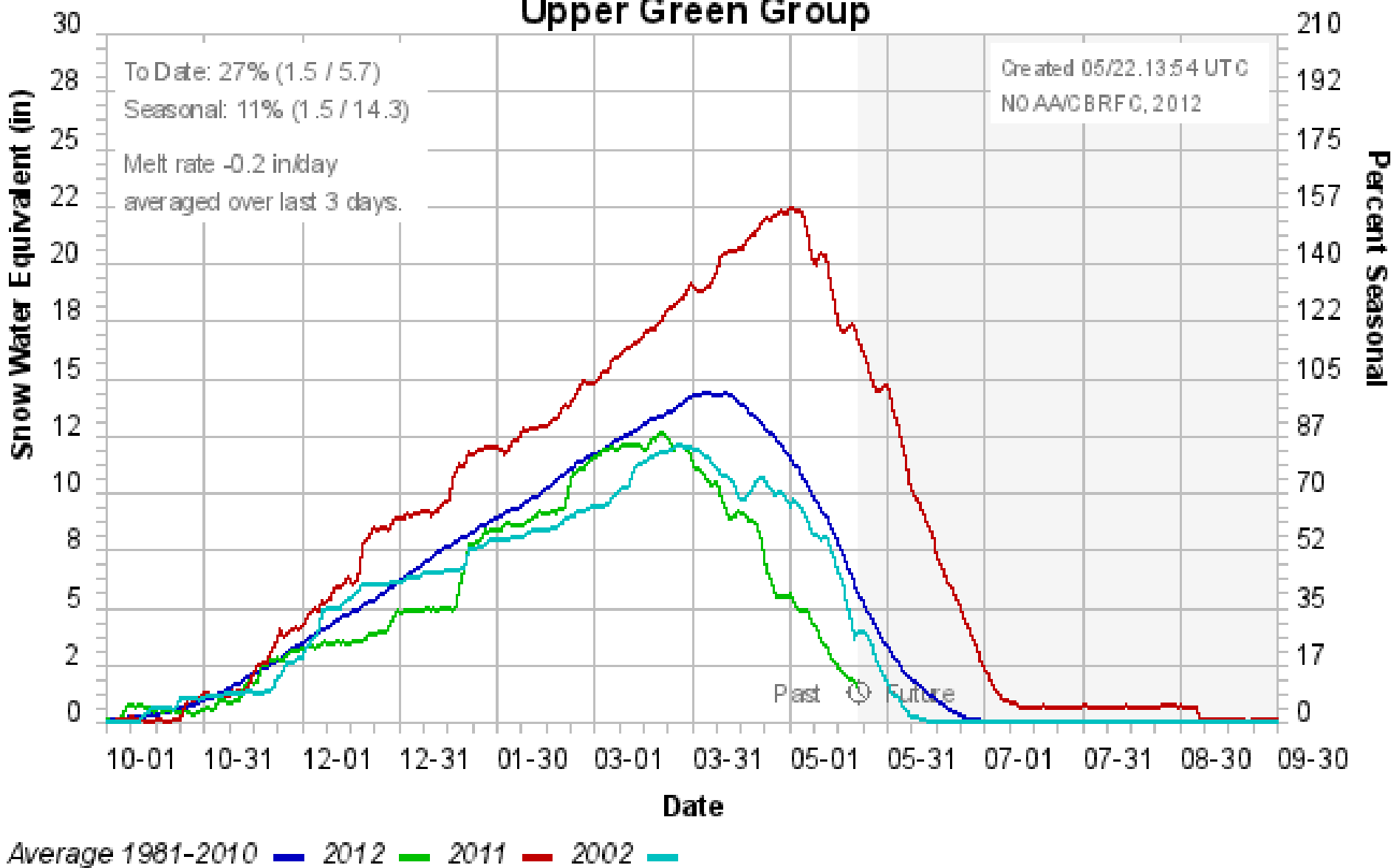


USDM May 15, 2012

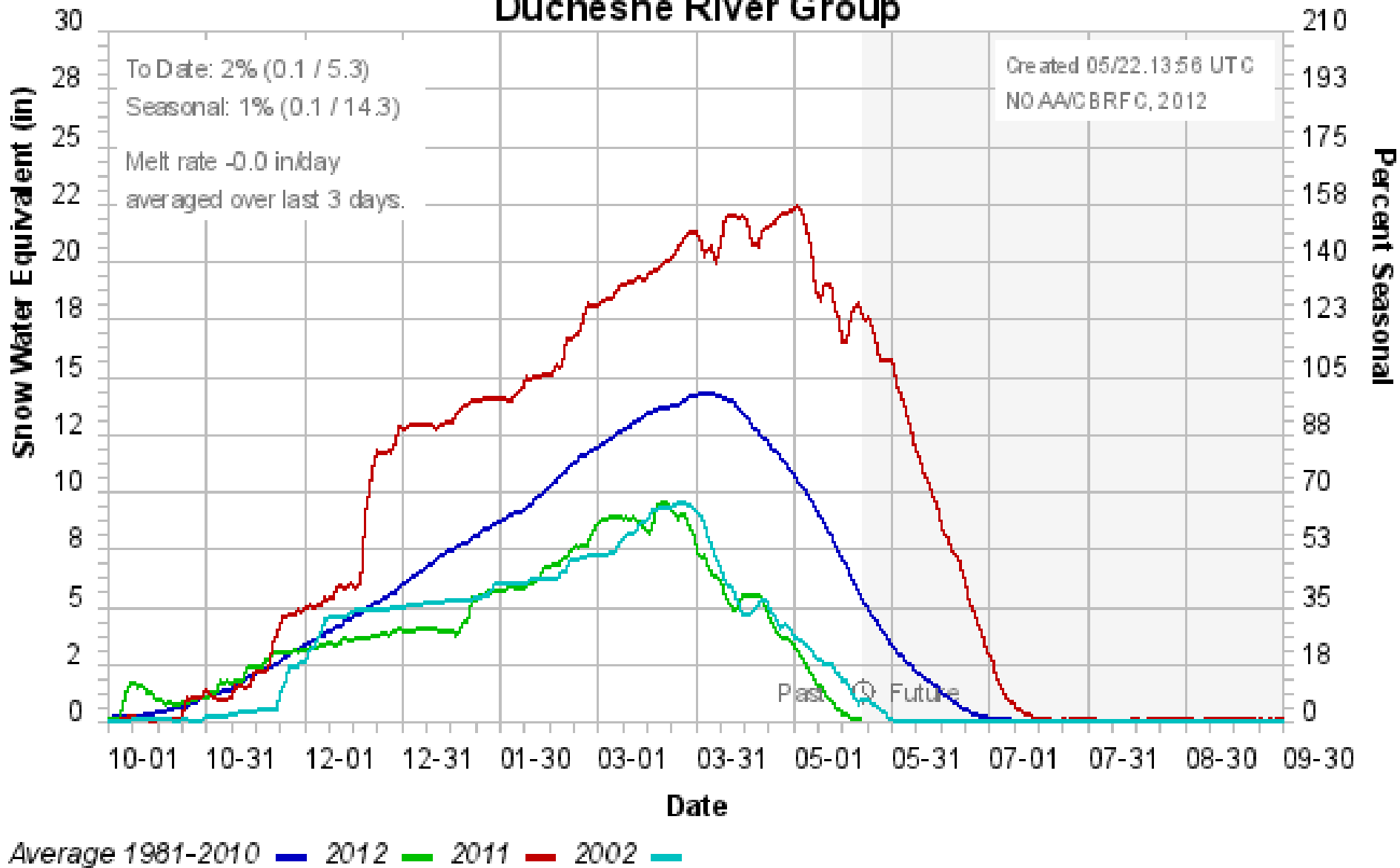


USDM May 5, 2002

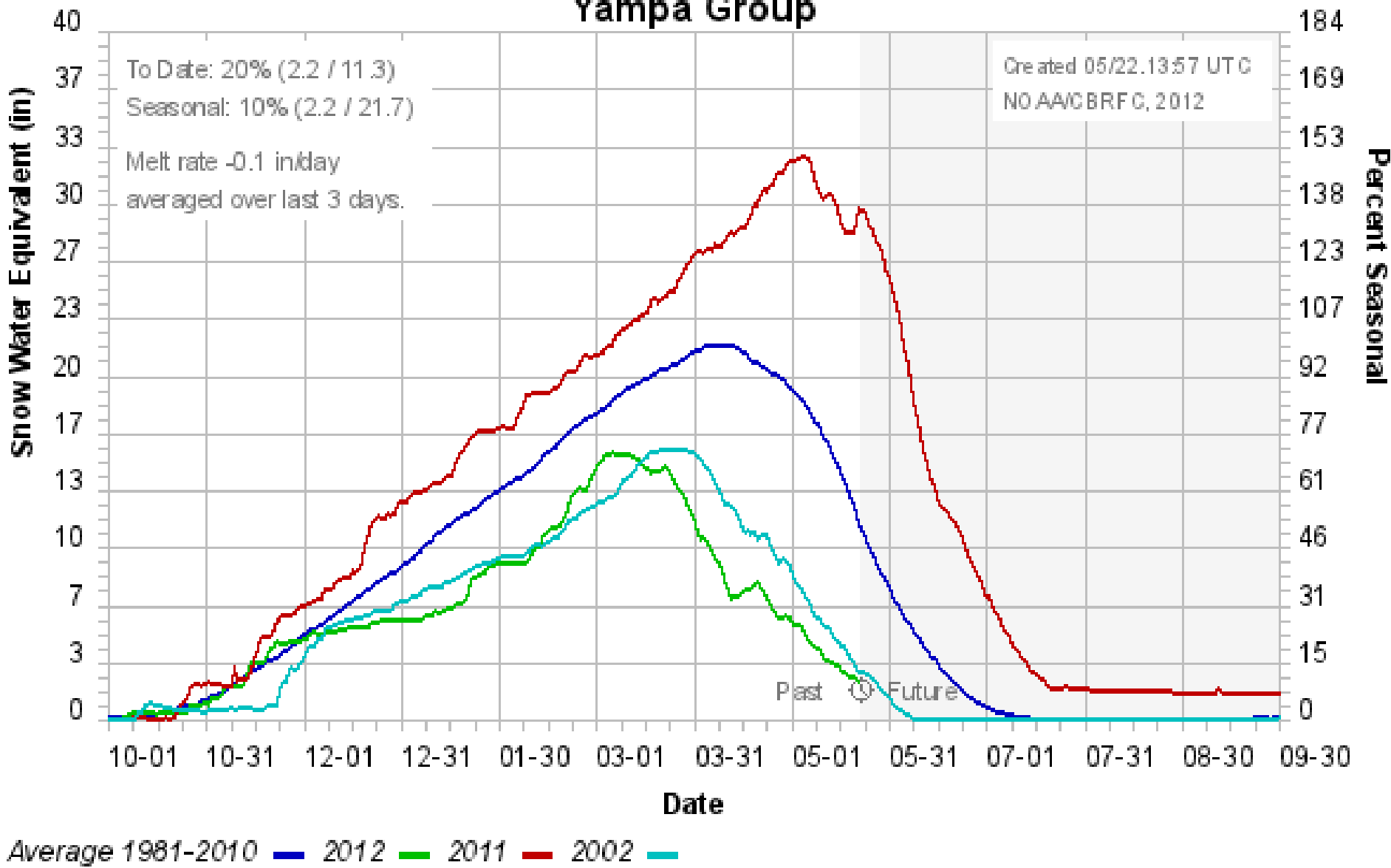
Colorado Basin River Forecast Center Upper Green Group



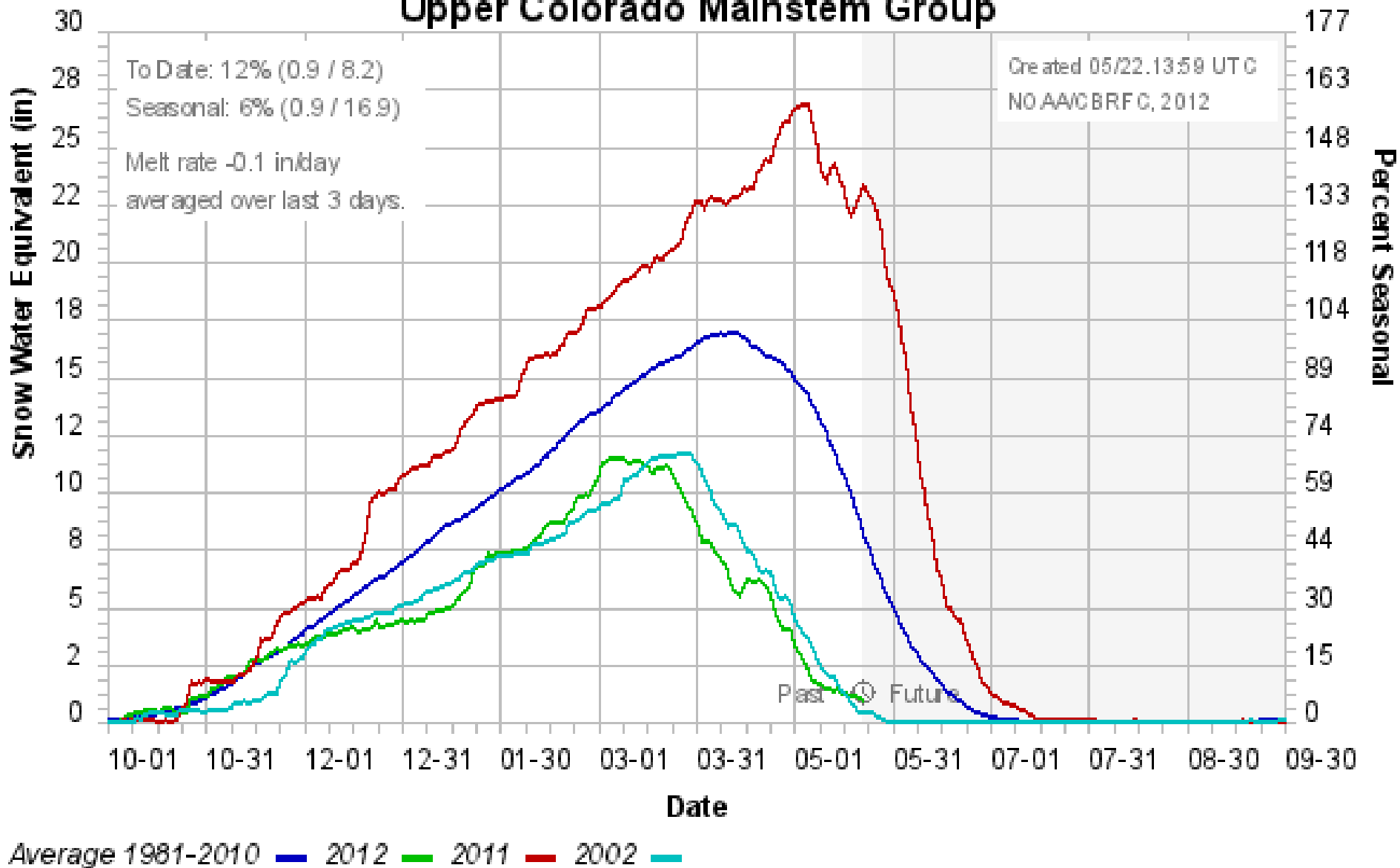
Colorado Basin River Forecast Center Duchesne River Group



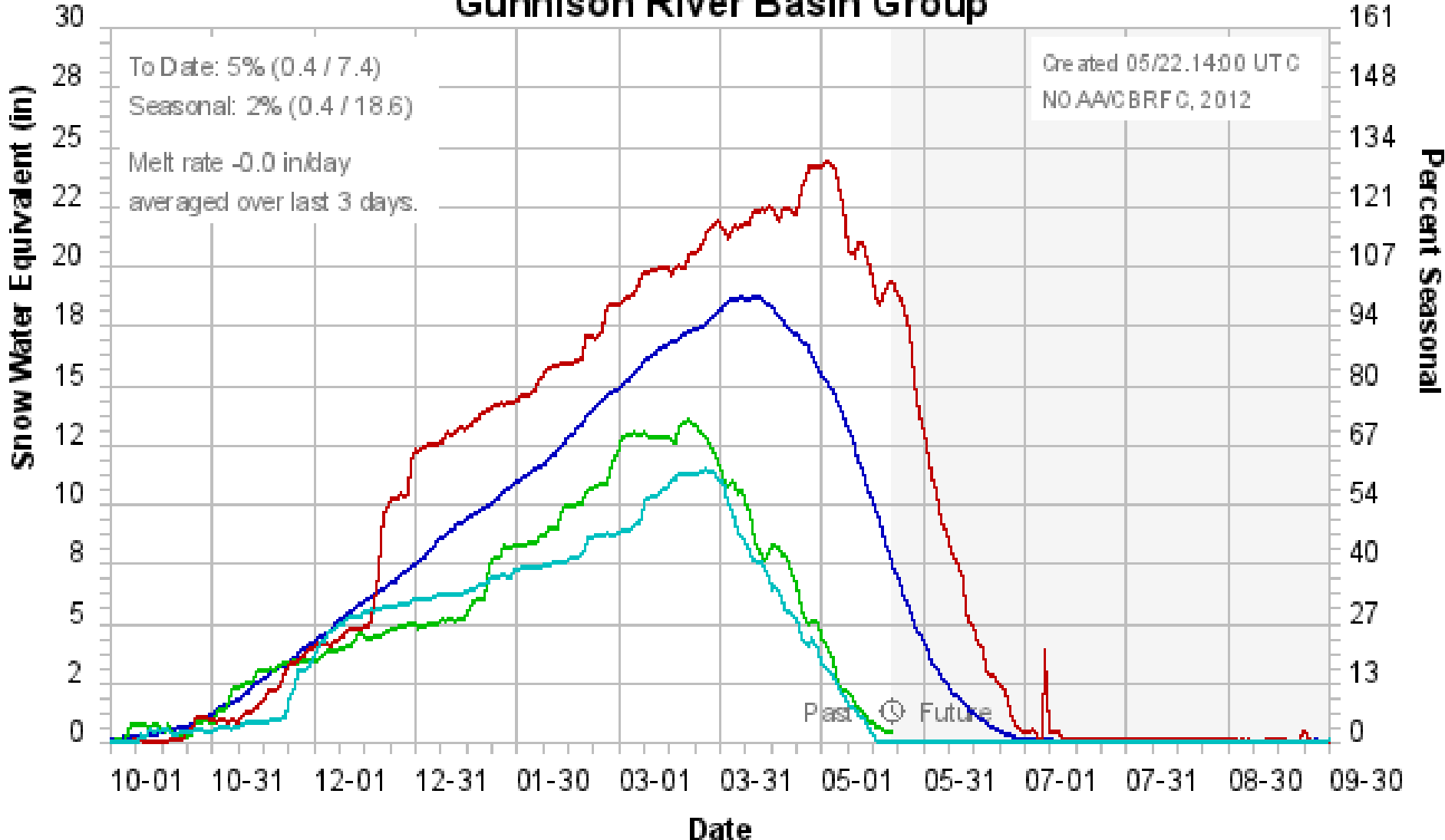
Colorado Basin River Forecast Center Yampa Group



Colorado Basin River Forecast Center Upper Colorado Mainstem Group

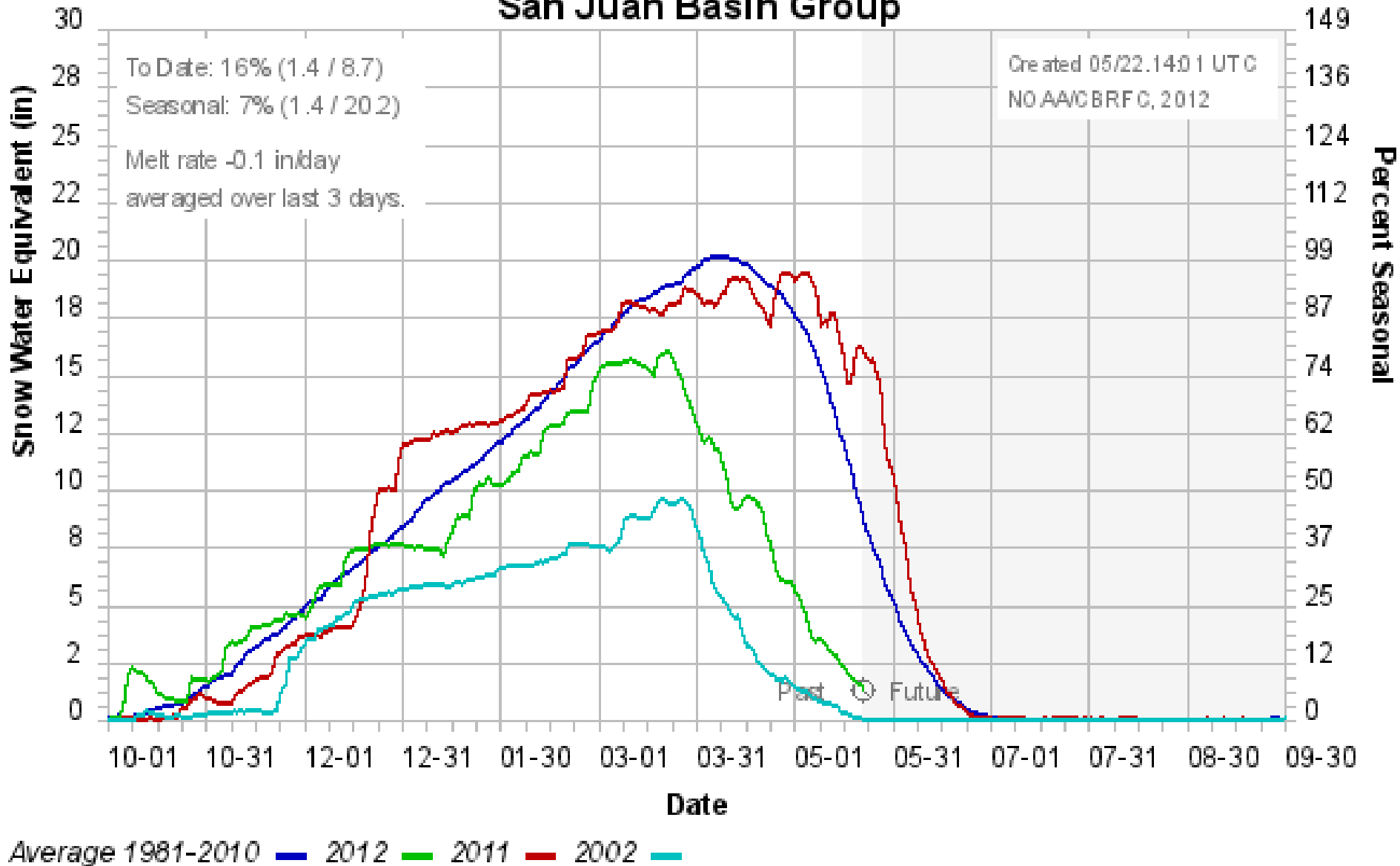


Colorado Basin River Forecast Center Gunnison River Basin Group



Average 1981-2010 2012 2011 2002

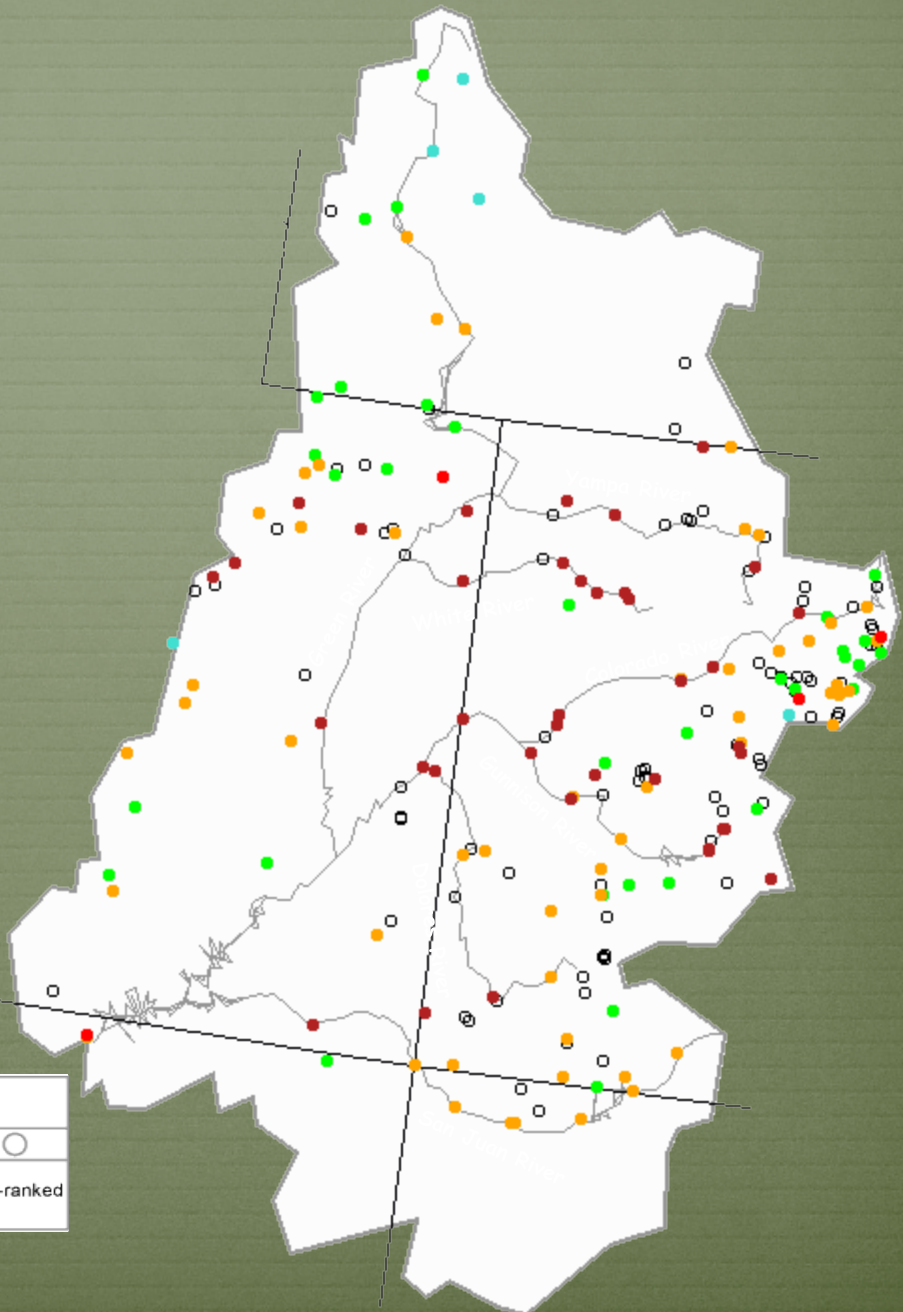
Colorado Basin River Forecast Center San Juan Basin Group



Streamflow Update

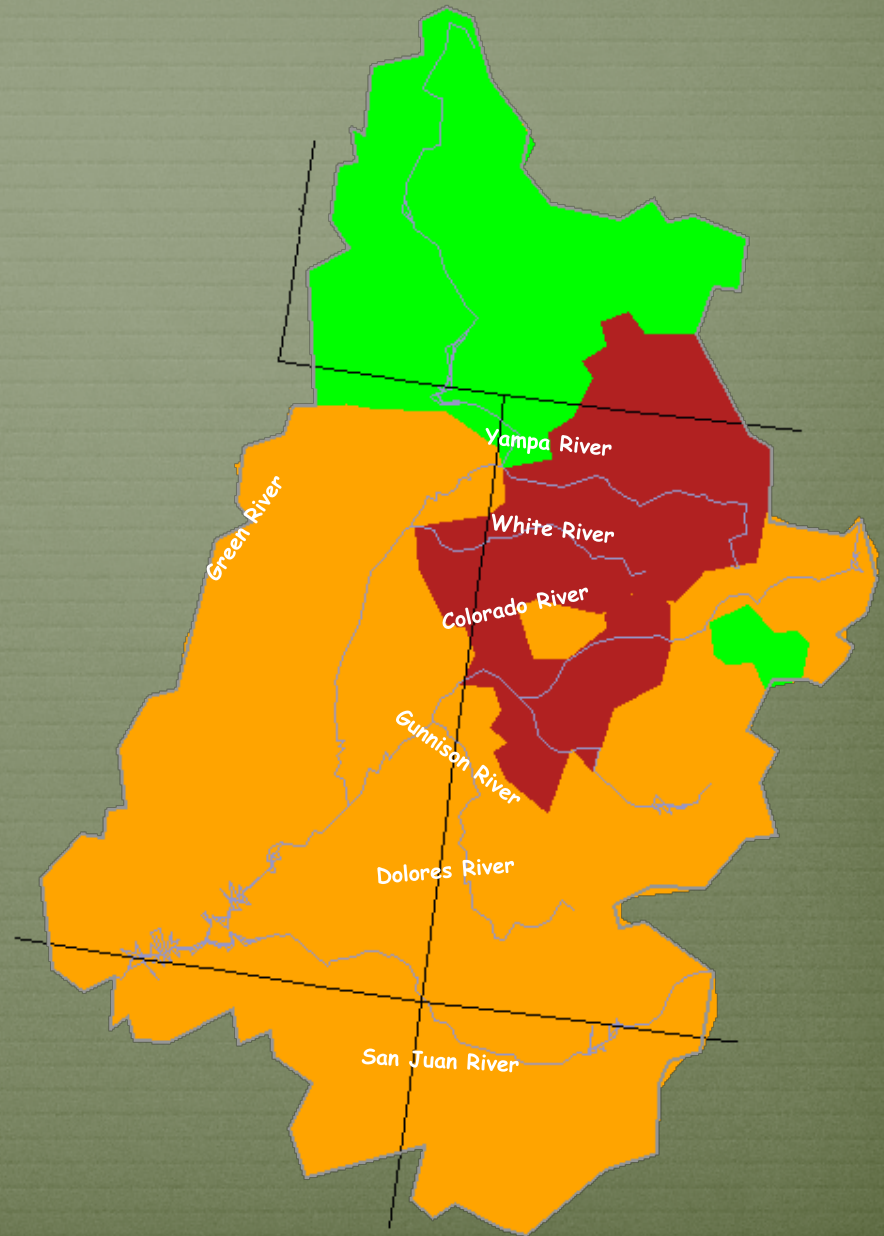


7-day average discharge compared to historical discharge for the day of the year (May 20)



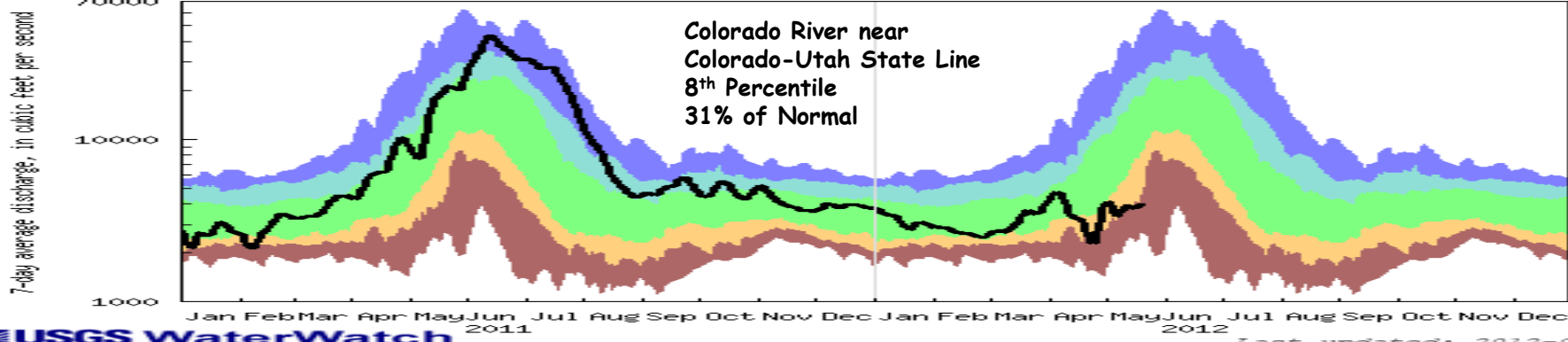
Explanation - Percentile classes							
●	●	●	●	●	●	●	○
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

7-day average discharge compared to historical discharge for the day of the year (May 20)

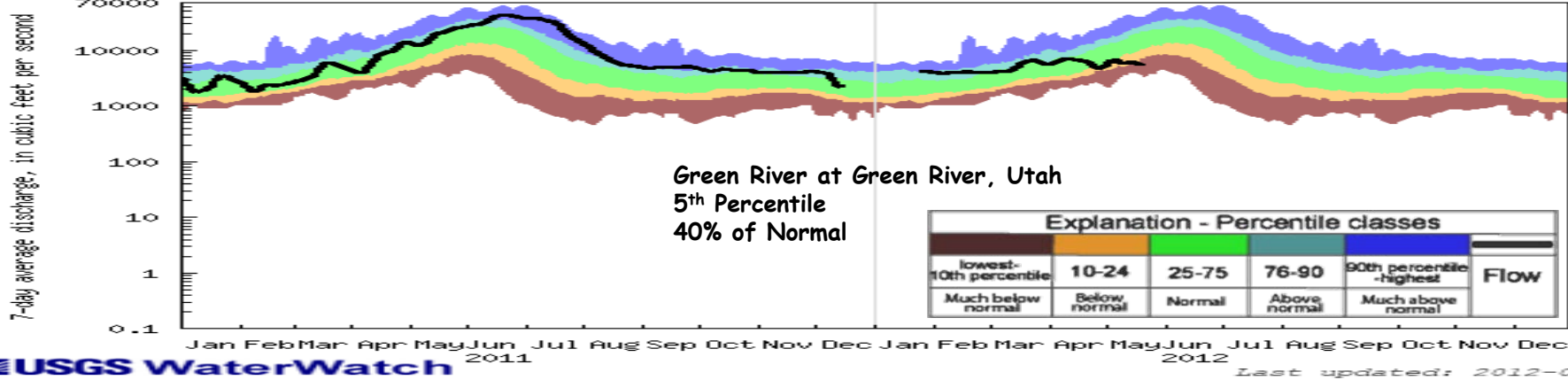


Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

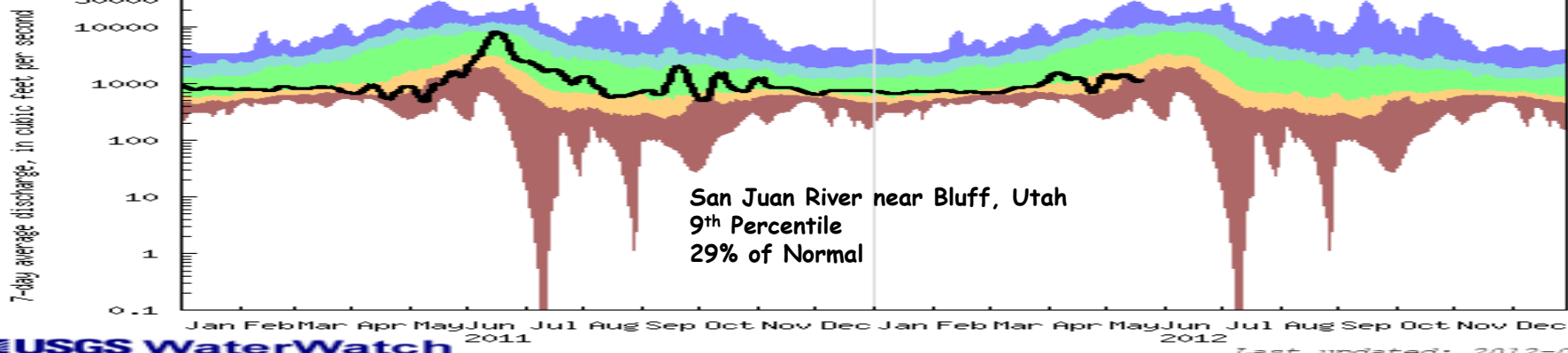
Duration hydrograph of 7-day average streamflow for USGS 09163500
 (Drainage Area: 17843 square miles, Length of Record: 59 years)



Duration hydrograph of 7-day average streamflow for USGS 09315000
 (Drainage Area: 44850 square miles, Length of Record: 116 years)

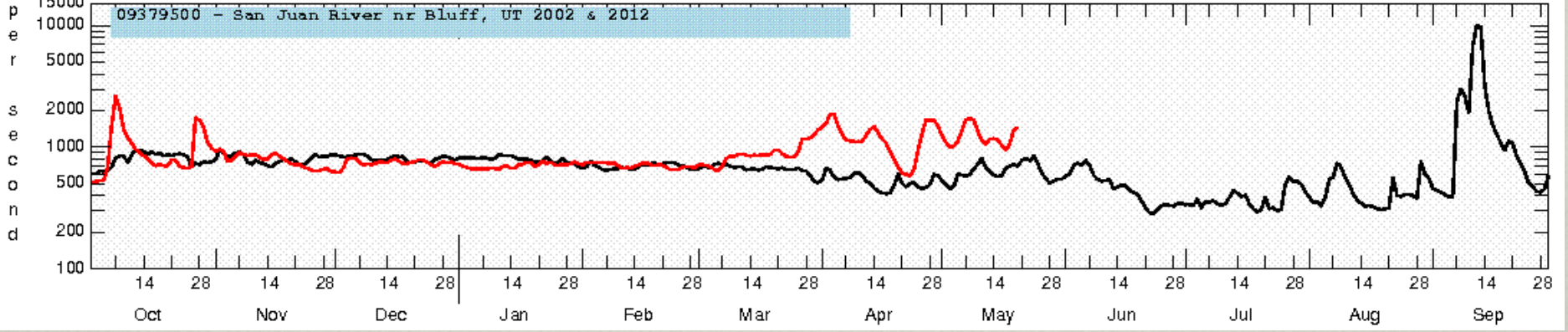
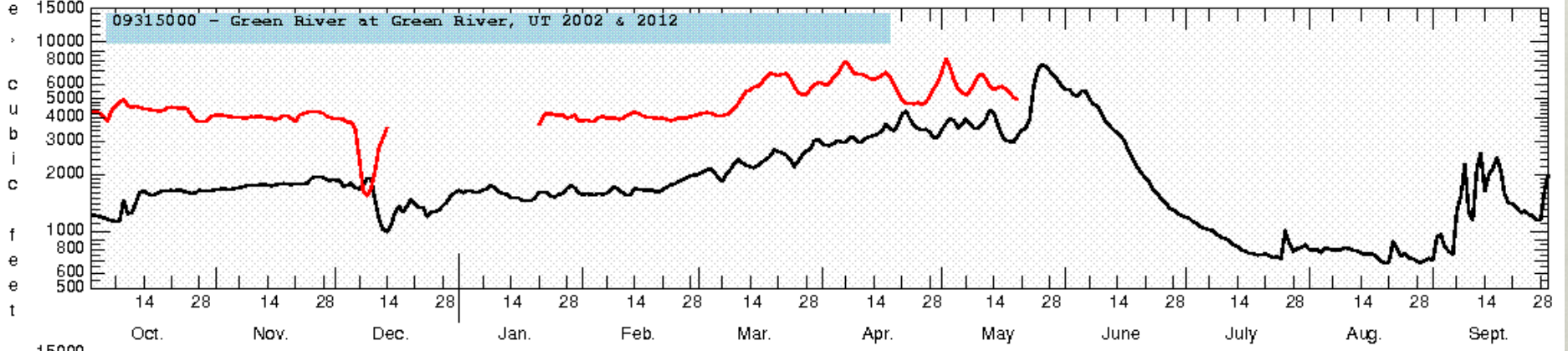
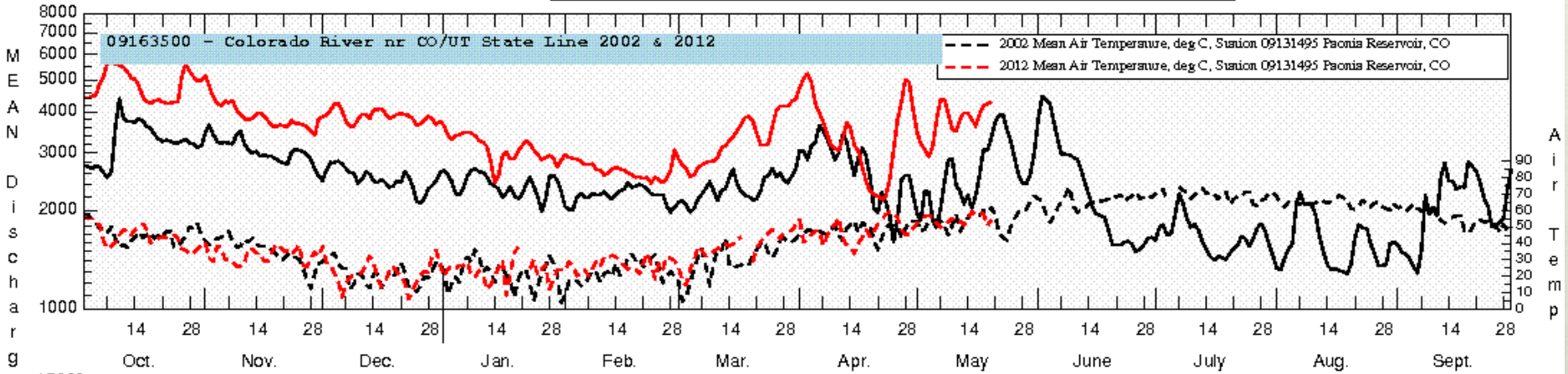


Duration hydrograph of 7-day average streamflow for USGS 09379500
 (Drainage Area: 23000 square miles, Length of Record: 96 years)



Colorado River Basin 2002 vs. 2012 Mean Daily Discharge Comparison at Select Stations

— Water Year 2002 Mean Daily Discharge
— Water Year 2012 Mean Daily Discharge (Provisional)

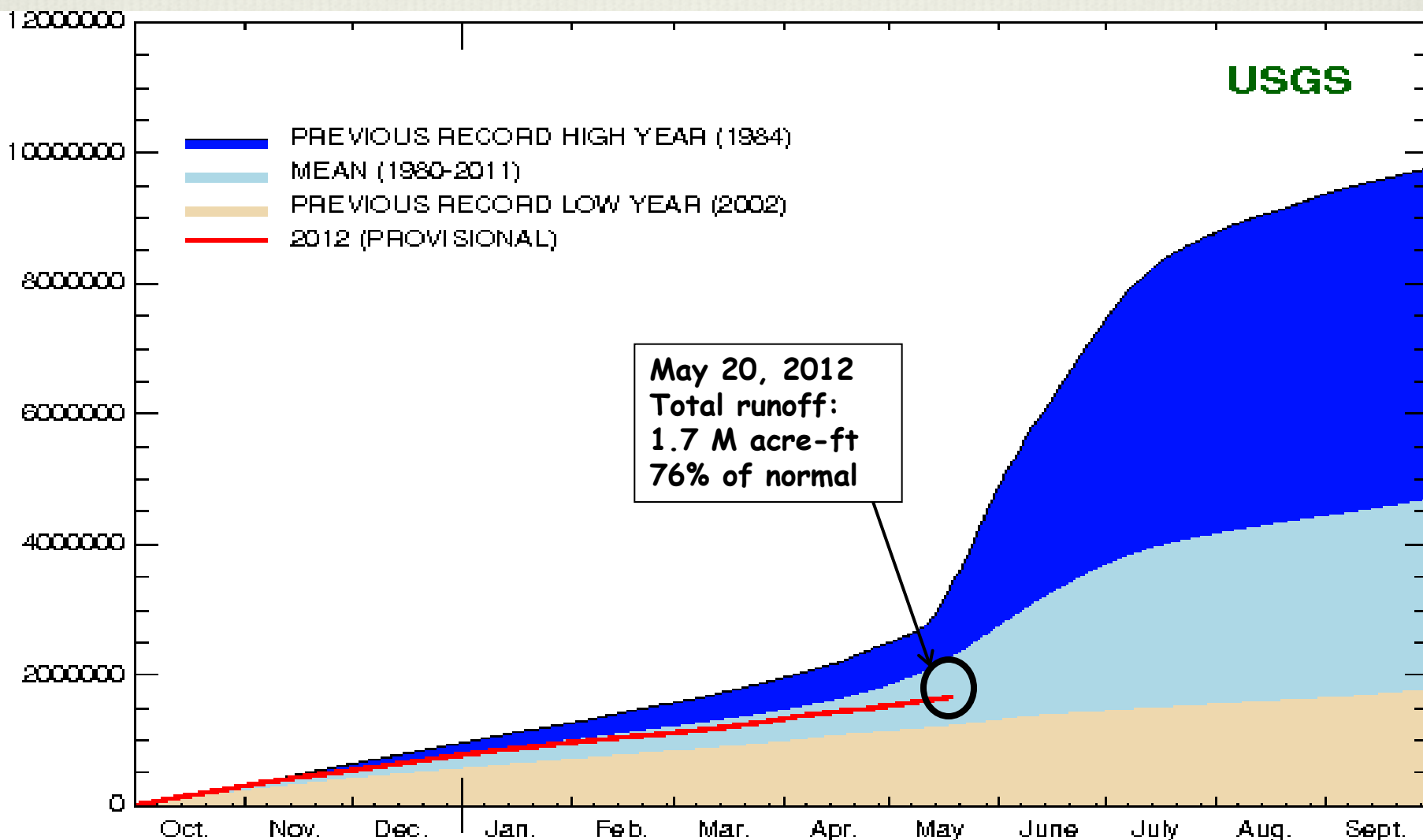


Total Streamflow Volume Colorado River nr CO/UT State Line Oct 1, 2011 to present

USGS

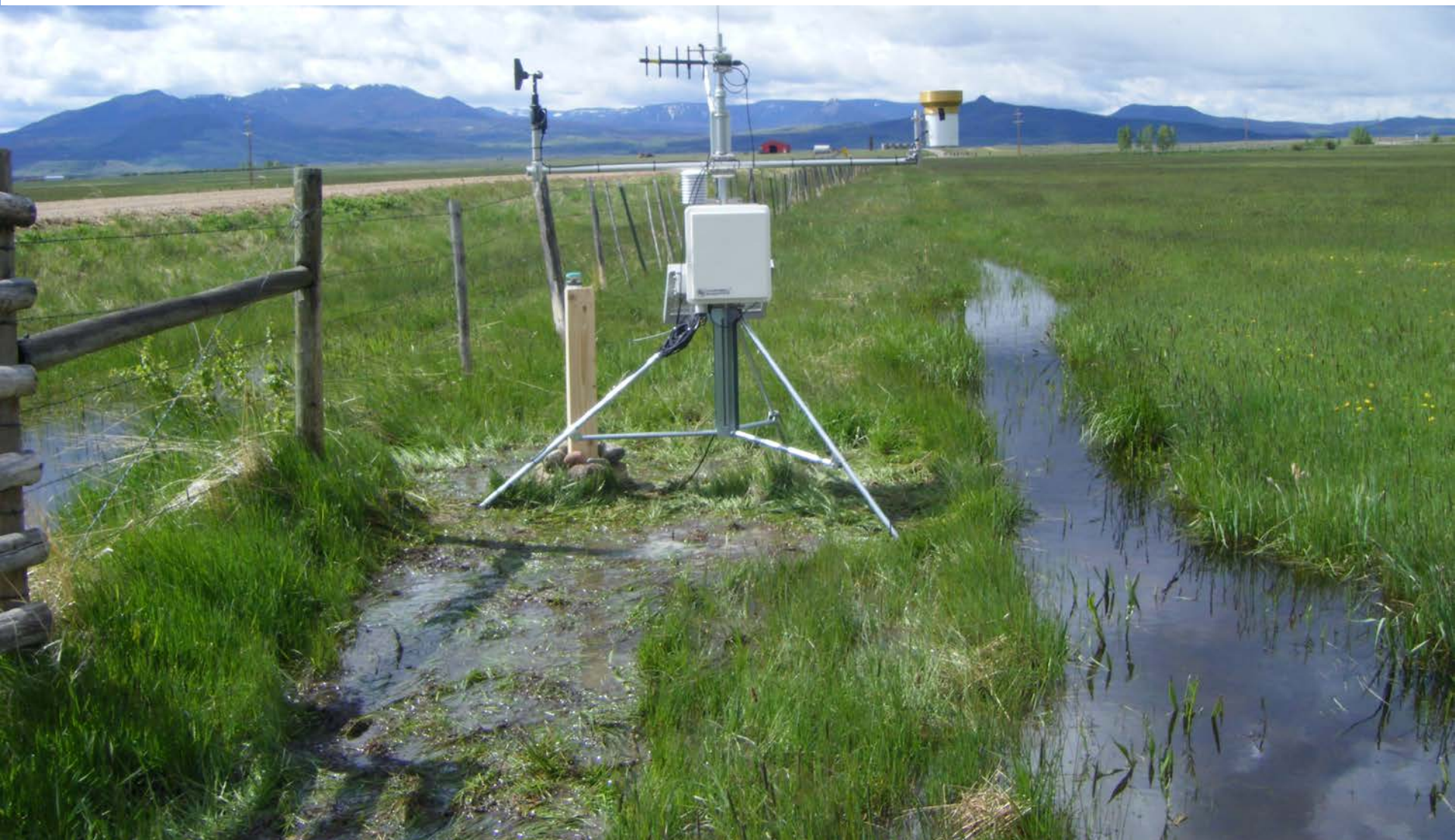
- PREVIOUS RECORD HIGH YEAR (1984)
- MEAN (1980-2011)
- PREVIOUS RECORD LOW YEAR (2002)
- 2012 (PROVISIONAL)

May 20, 2012
Total runoff:
1.7 M acre-ft
76% of normal

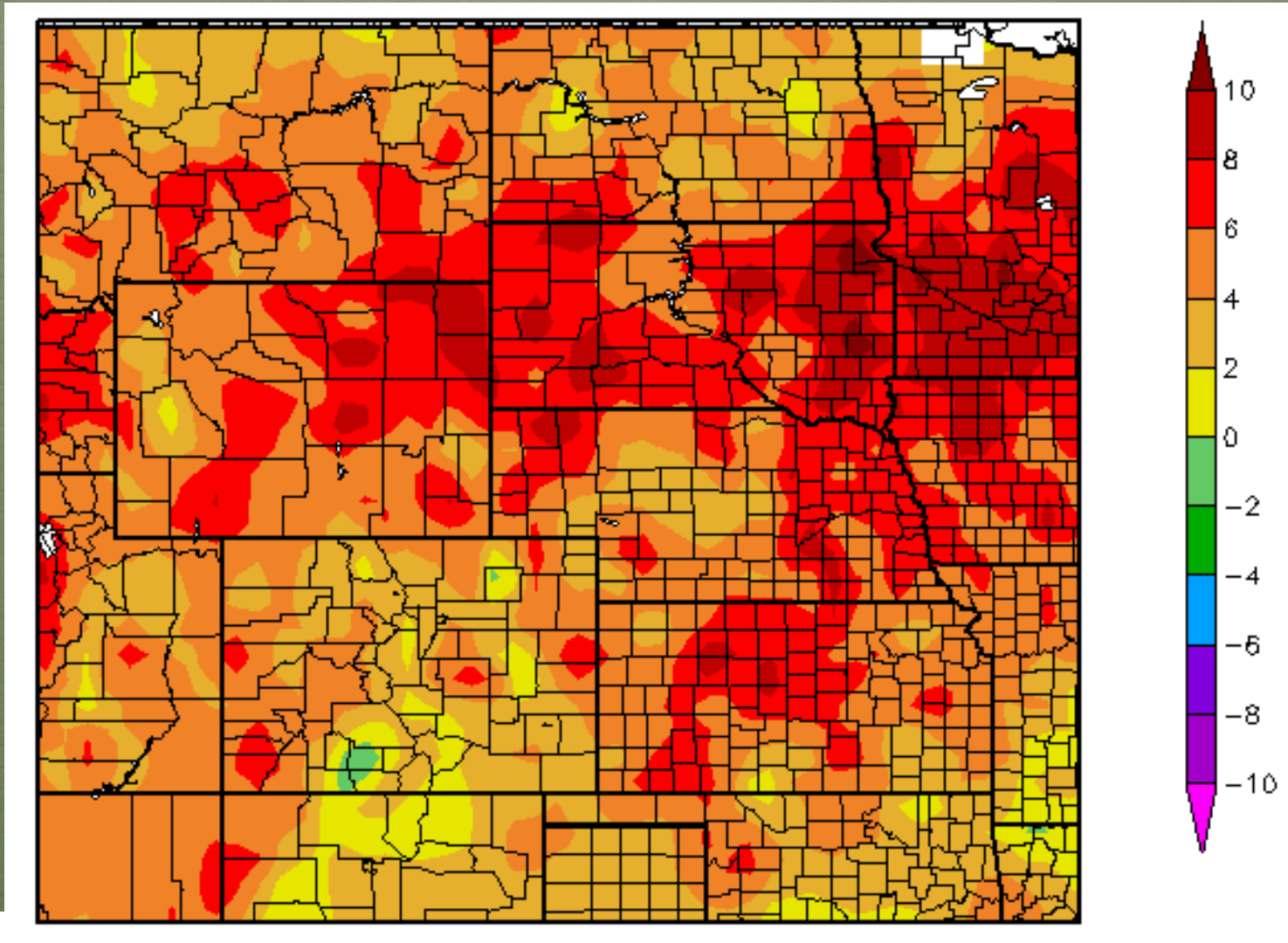


COLORADO RIVER NEAR COLORADO-UTAH STATELINE

Water Demand

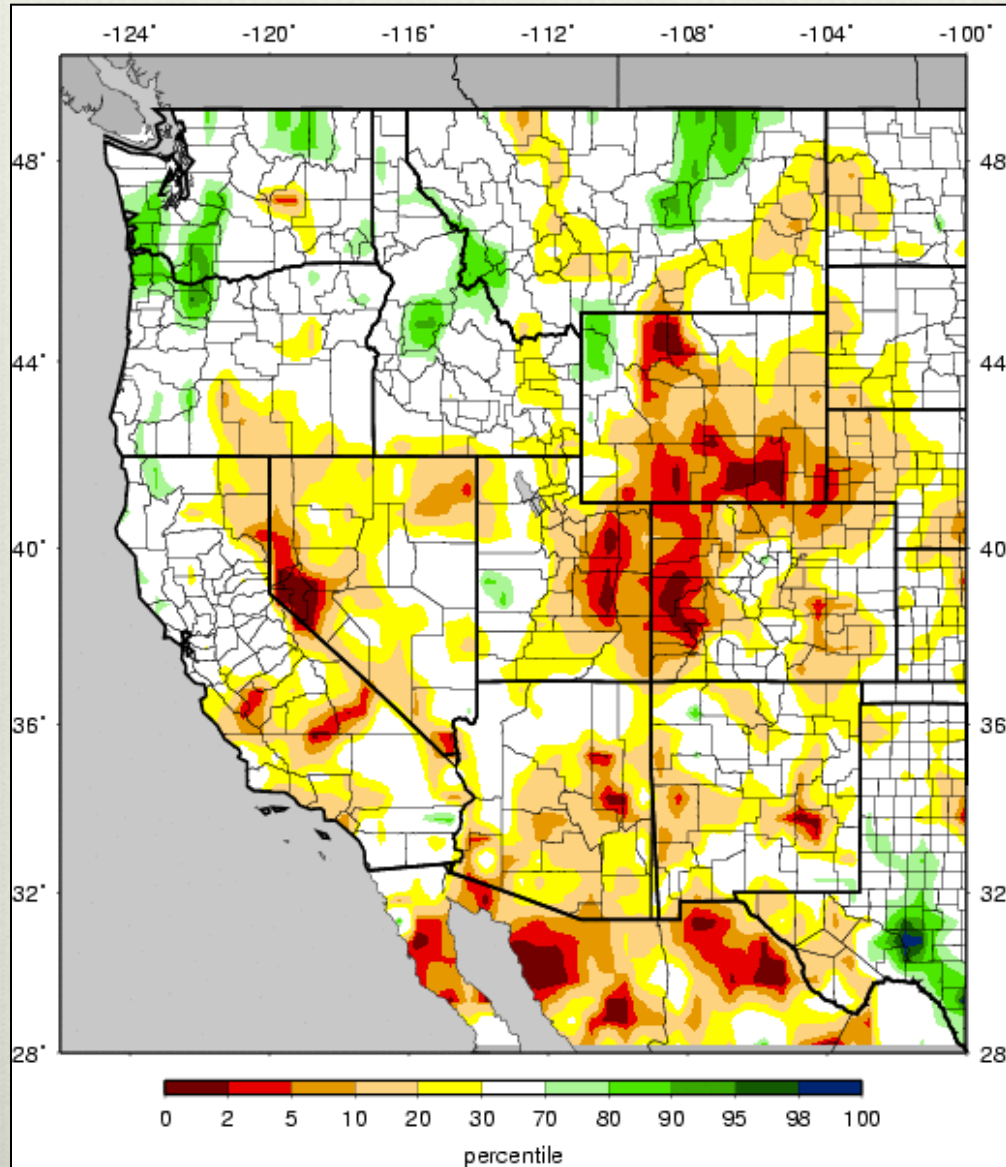


Temperature Departure from Normal 05/14/2012 – 05/20/2012



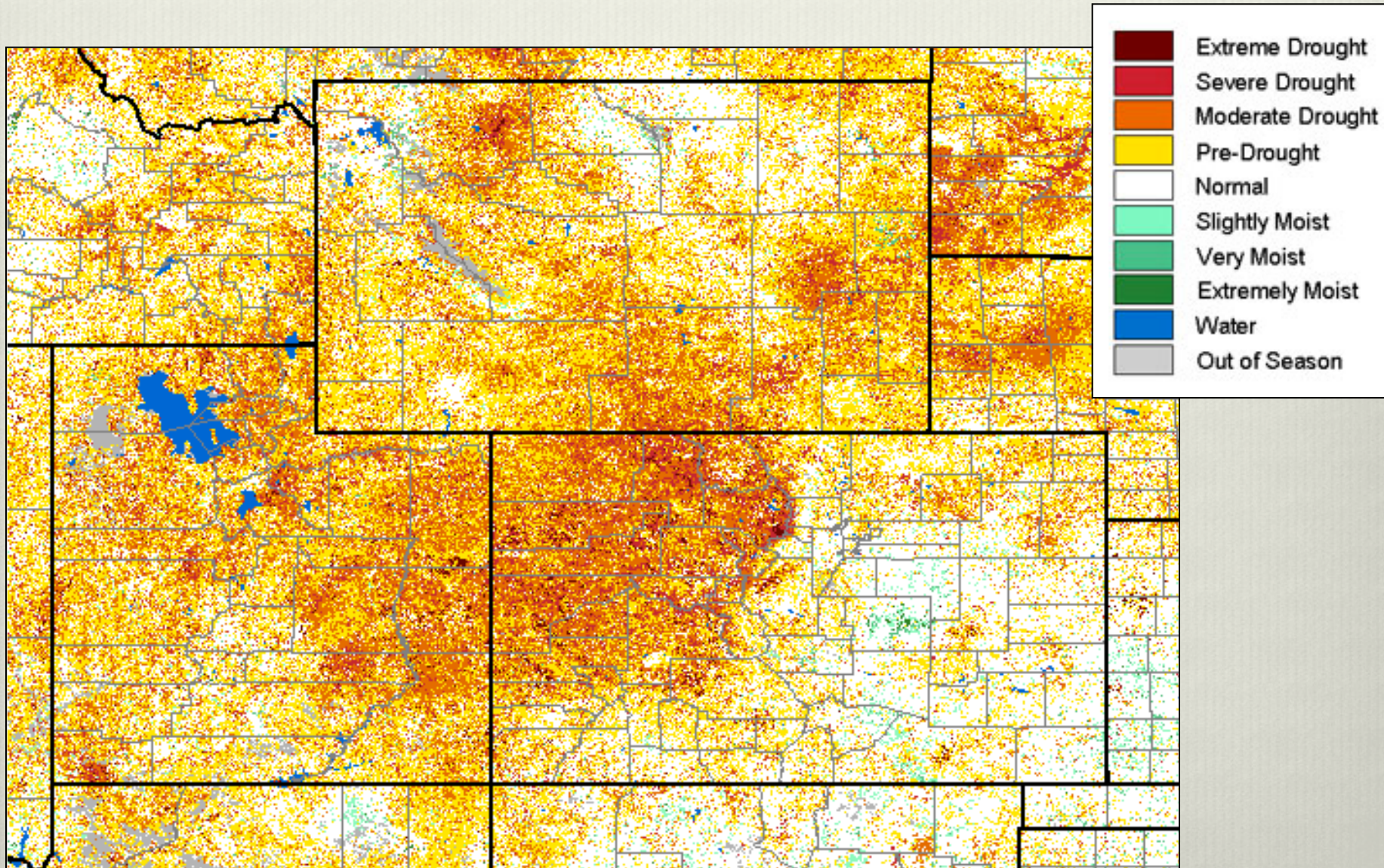
VIC Soil Moisture

20 May 2012



eMODIS VegDRI Vegetation

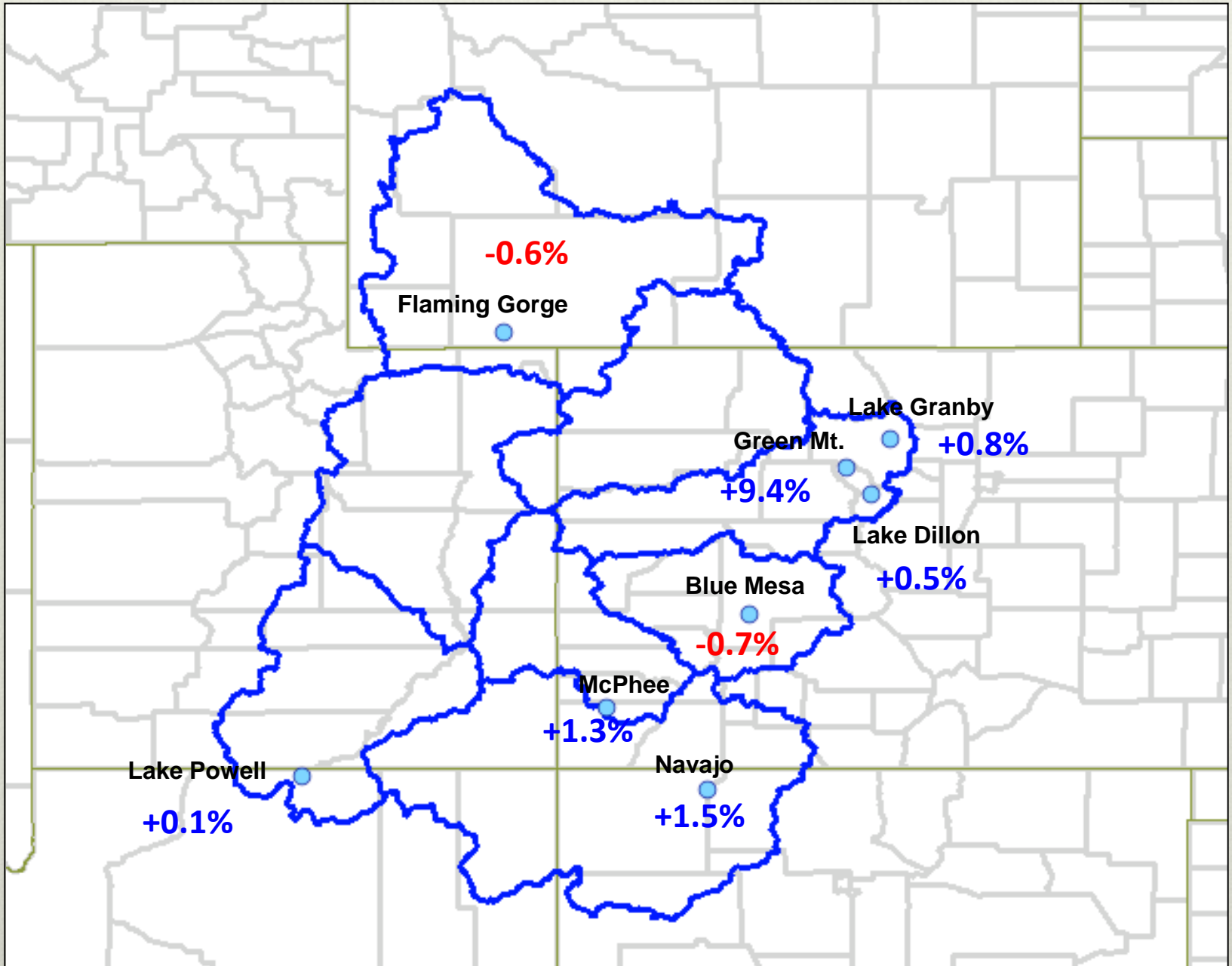
20 May 2012



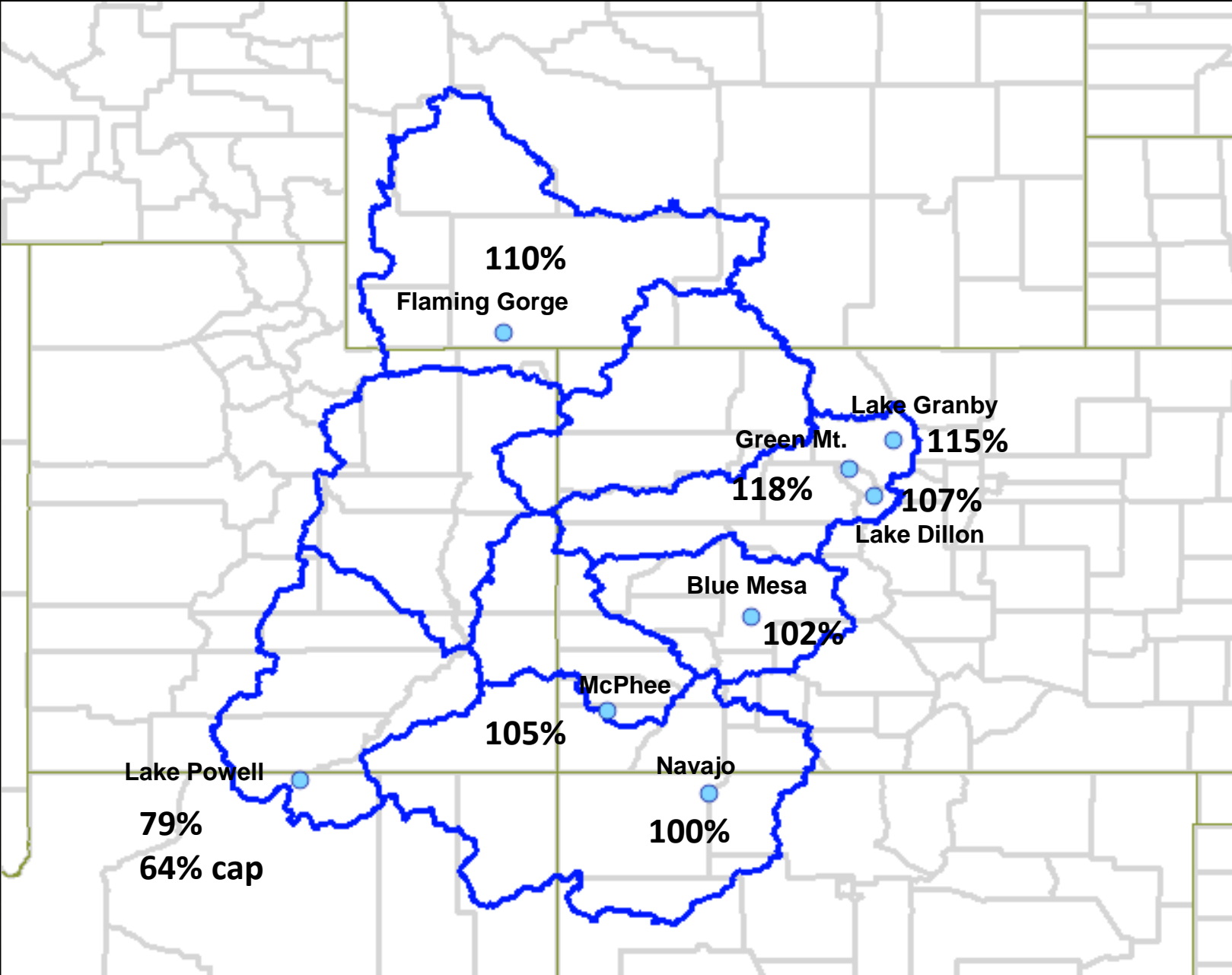
Reservoir Update



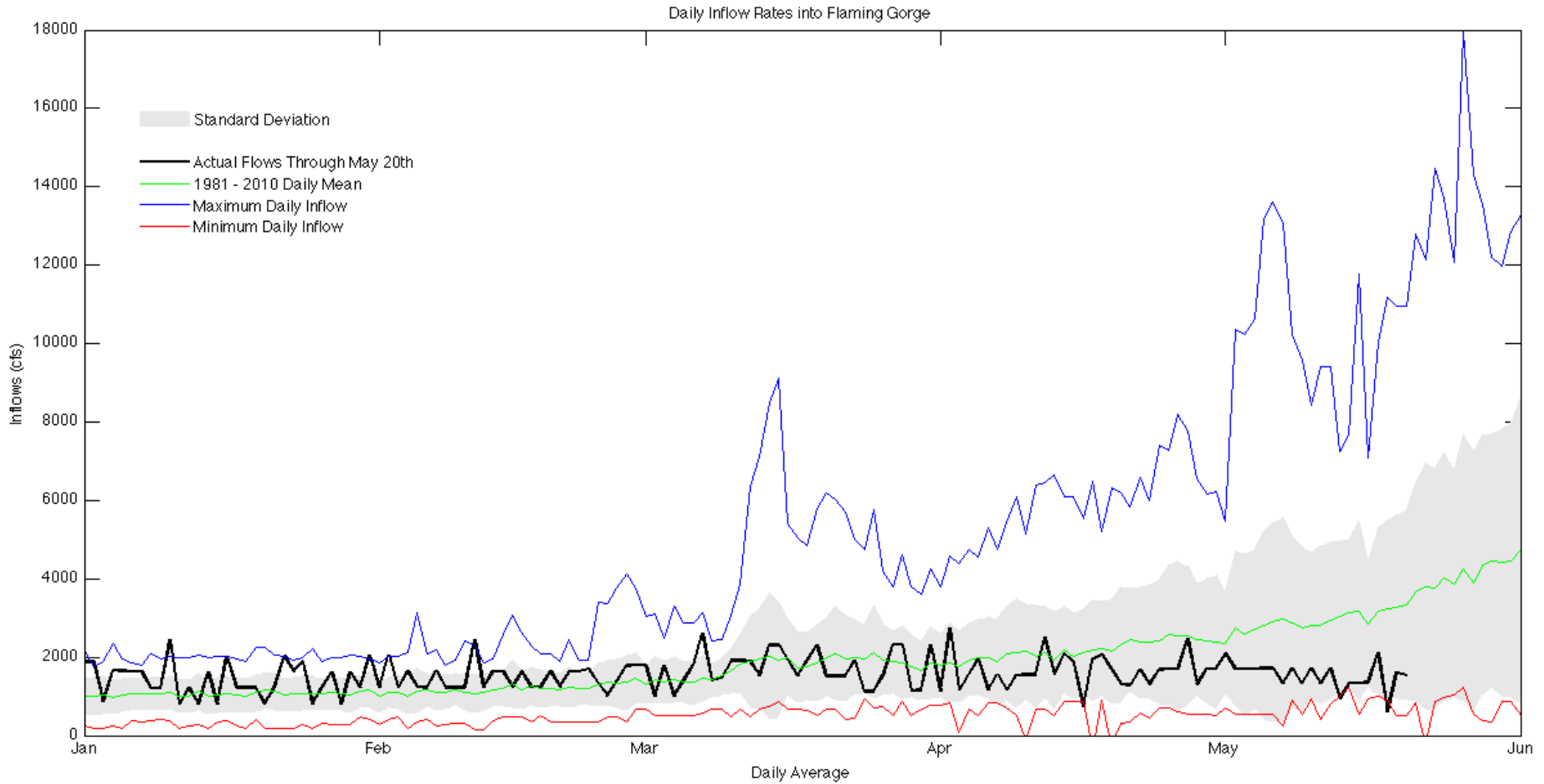
May Reservoir Storage Volume Change



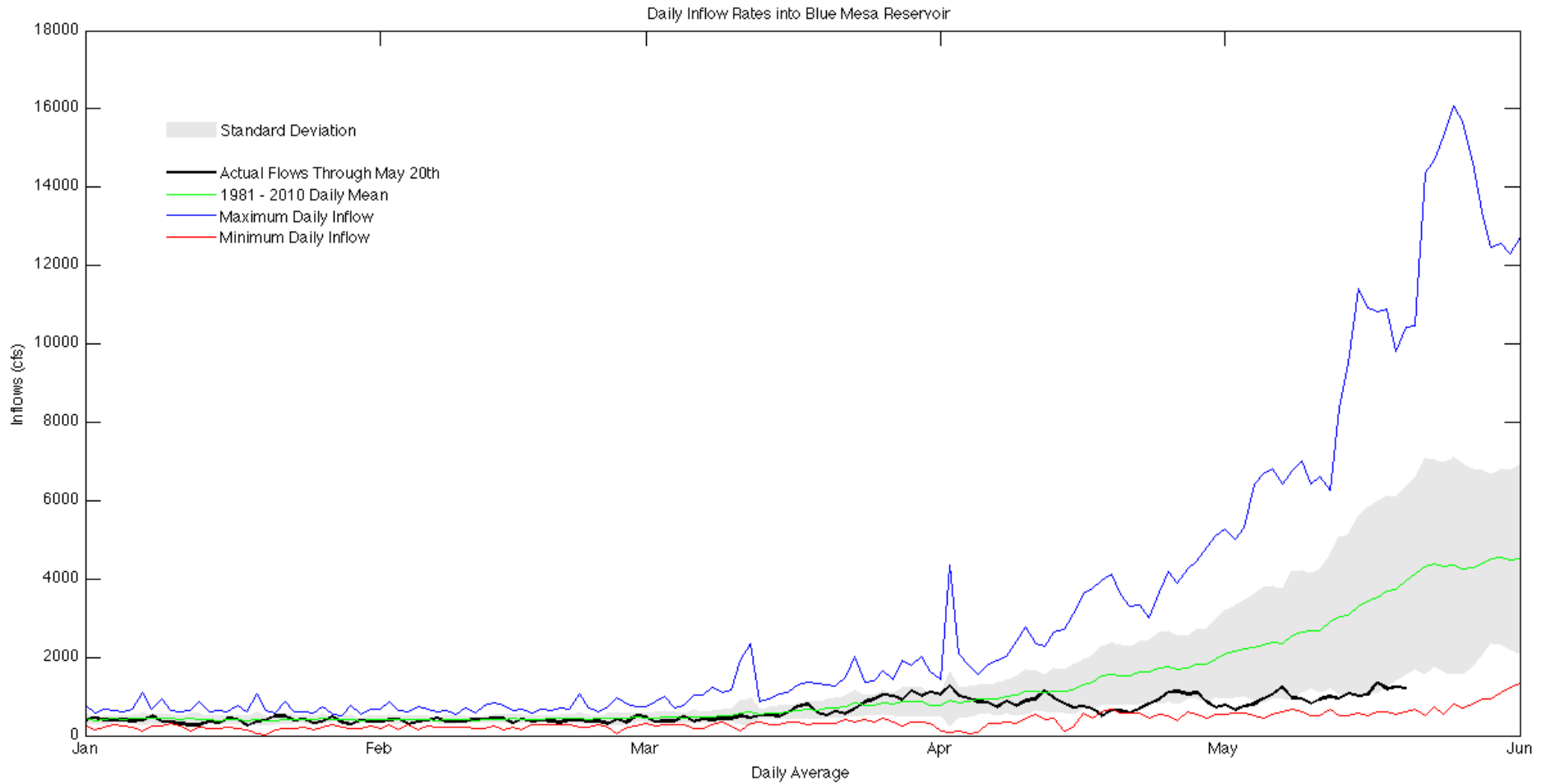
May Average Reservoir Storage Volume



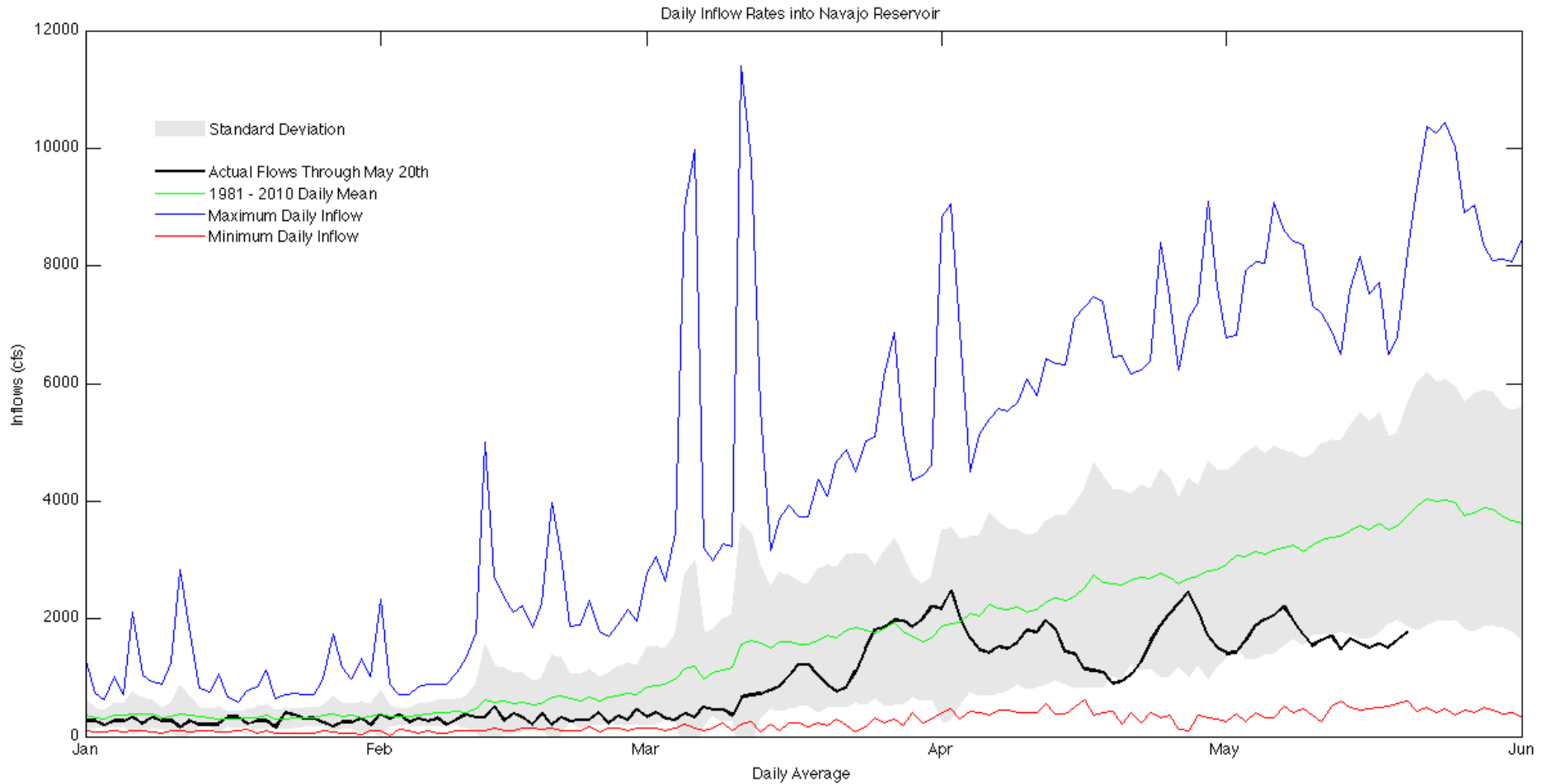
Daily Inflows into Flaming Gorge



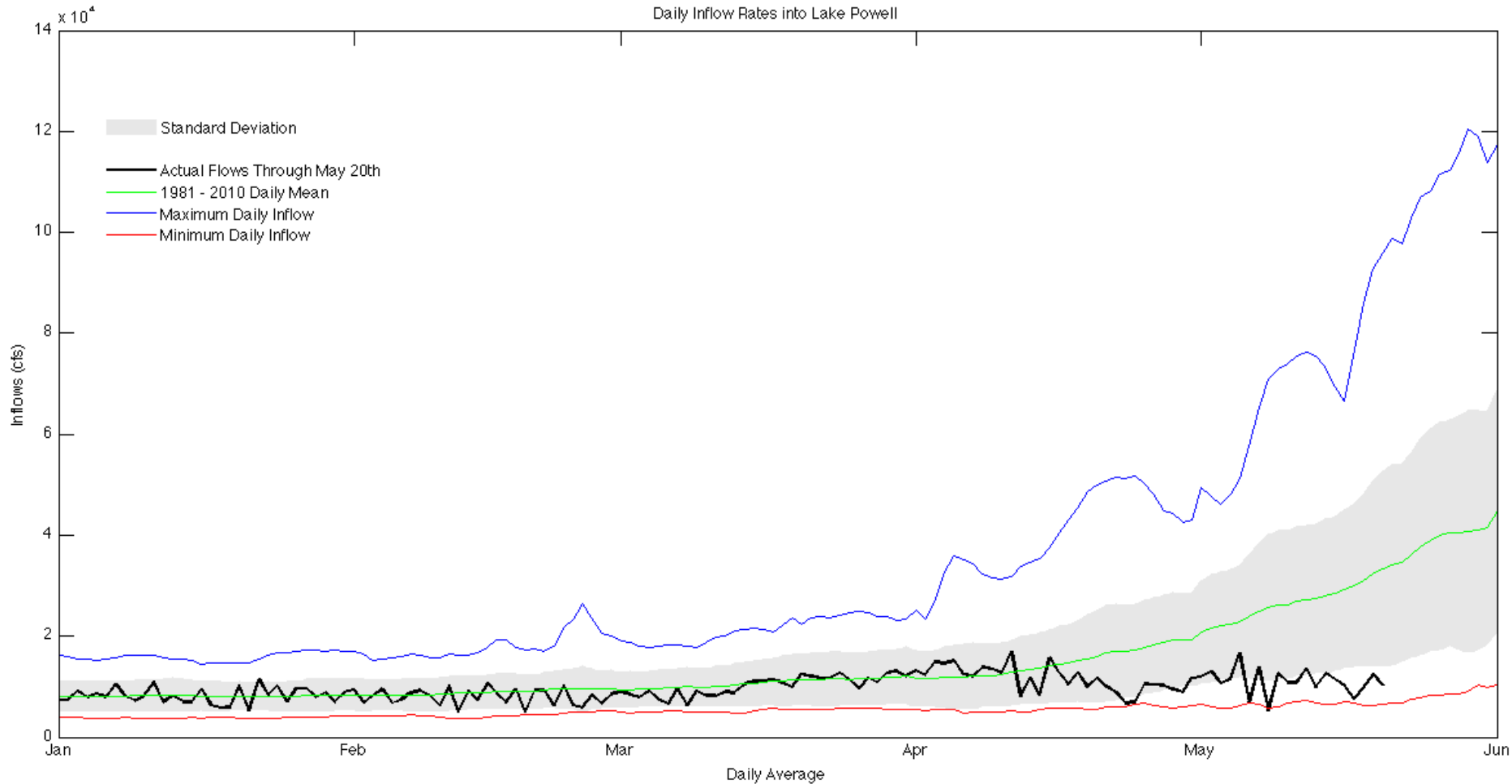
Daily Inflows into Blue Mesa



Daily Inflows into Navajo

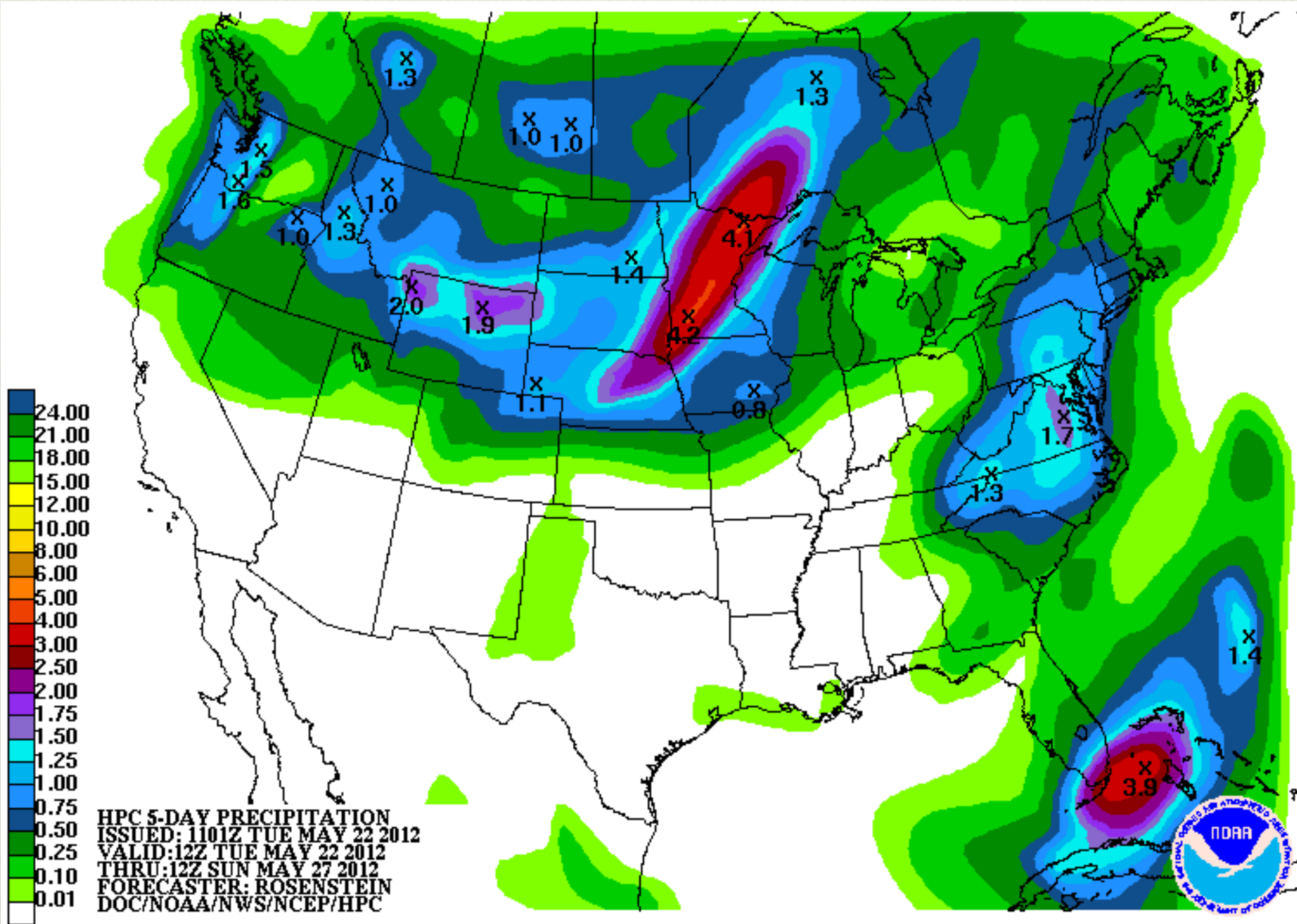


Daily Inflows into Lake Powell

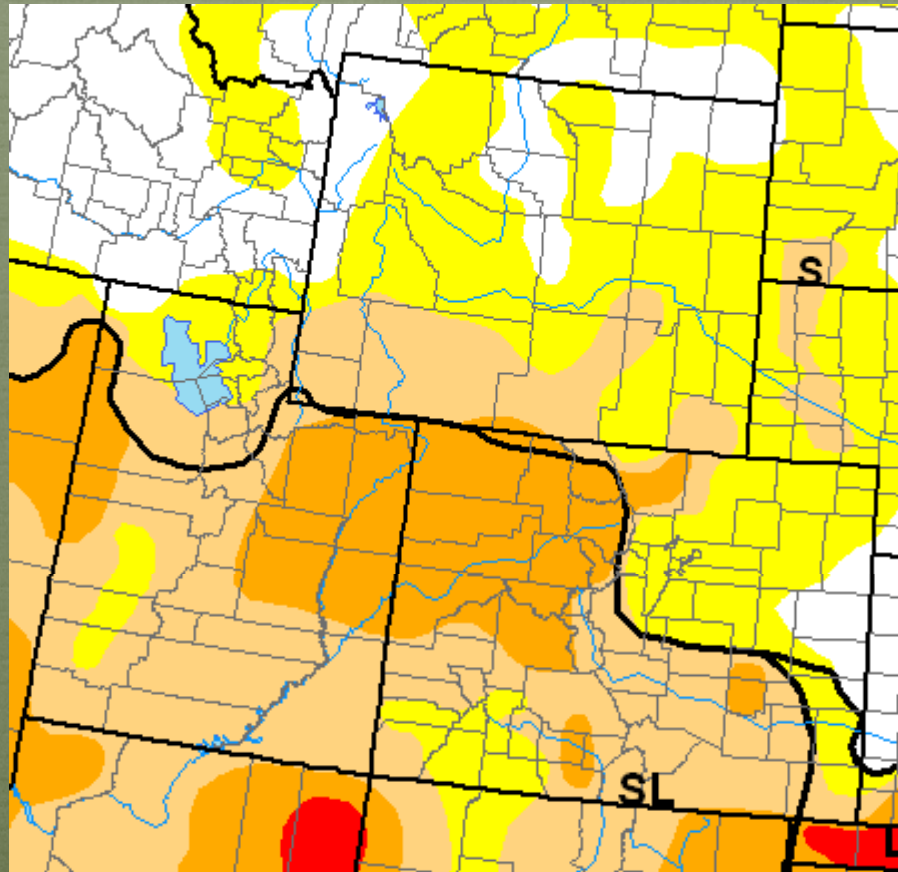


Precipitation Forecast





Recommendations



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NIDIS - UPPER COLORADO BASIN PILOT PROJECT

F o r m o r e i n f o r m a t i o n

NIDIS Weekly Climate, Water and Drought Assessment Summary

Upper Colorado River Basin

May 22, 2012

Precipitation and Snowpack

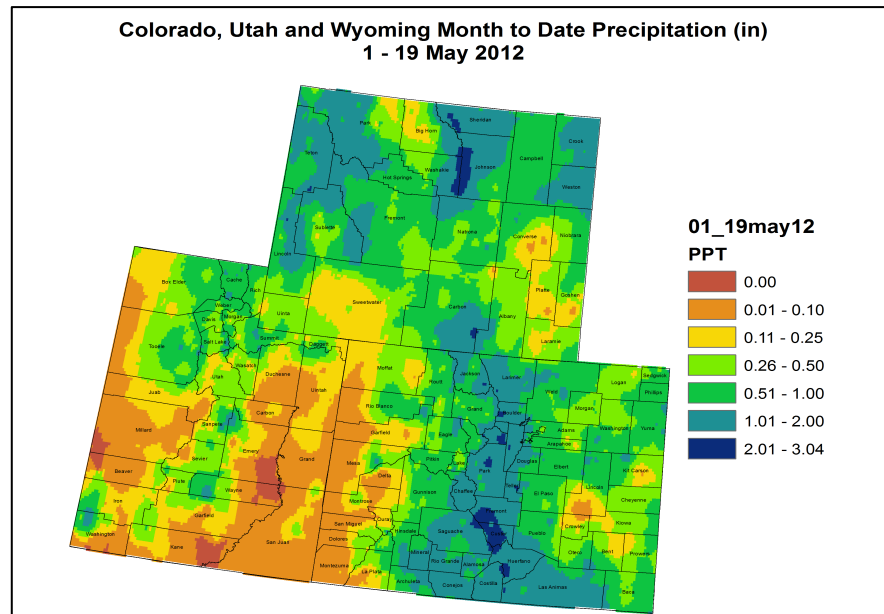


Fig. 1: May month-to-date precipitation in inches.

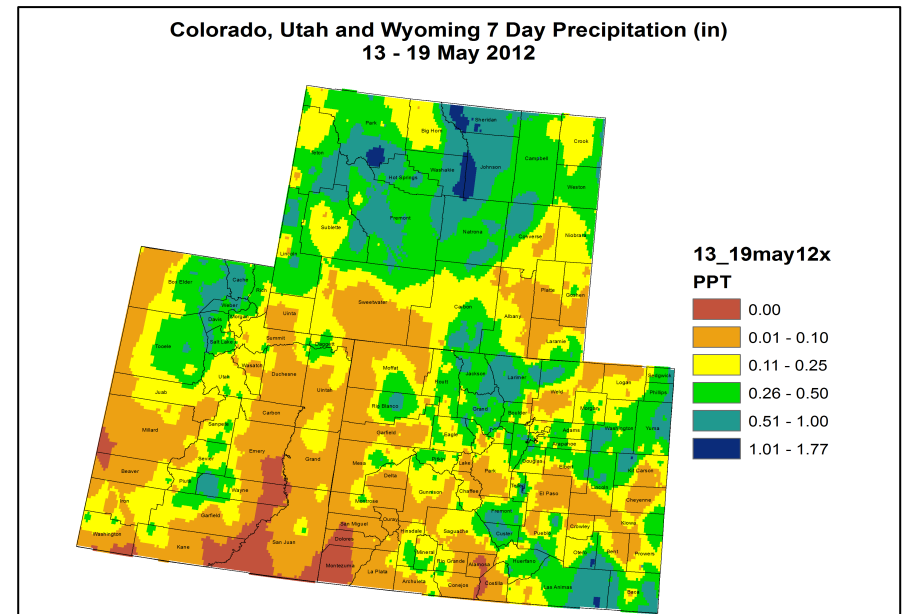


Fig. 2: May 13 – 19 precipitation in inches.

For the month of May so far, the heaviest precipitation has been concentrated along the Front Range of Colorado, just east of the Continental Divide and southern CO, with many of those areas, including the San Luis Valley, receiving between 1 and 2 inches of moisture (Fig. 1). Higher elevations in the UCRB have received between half an inch and 2 inches for the month, but most of the lower elevations have seen less than a quarter of an inch. Most of eastern CO has received between a quarter inch and an inch of precipitation since the beginning of the month.

Last week, precipitation was spotty around the UCRB (Fig. 2). Some areas along the Wasatch Range in Utah and in northern CO received between a tenth and a half an inch, with a couple of isolated locations seeing more than half an inch. Widespread accumulations of less than a tenth of an inch were seen across much of the basin with no precipitation along the Colorado River just above Lake Powell. Many locations in eastern CO received between a tenth of an inch and half an inch of moisture for the week, while the San Luis Valley received less than a tenth of an inch.

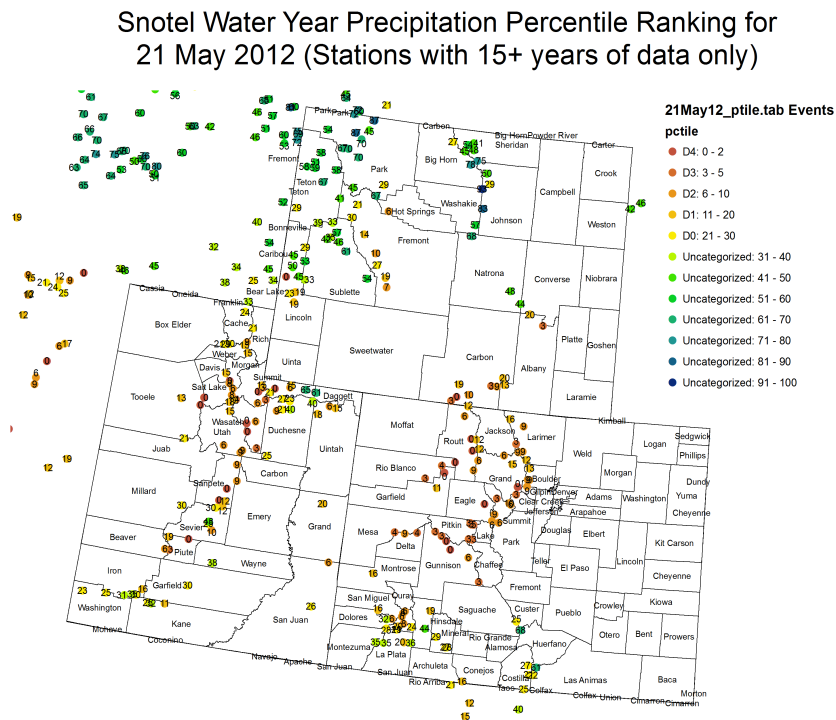


Fig. 3: SNOTEL WYTD precipitation percentiles (50% is median, 21 – 30% is Drought Monitor D0 category).

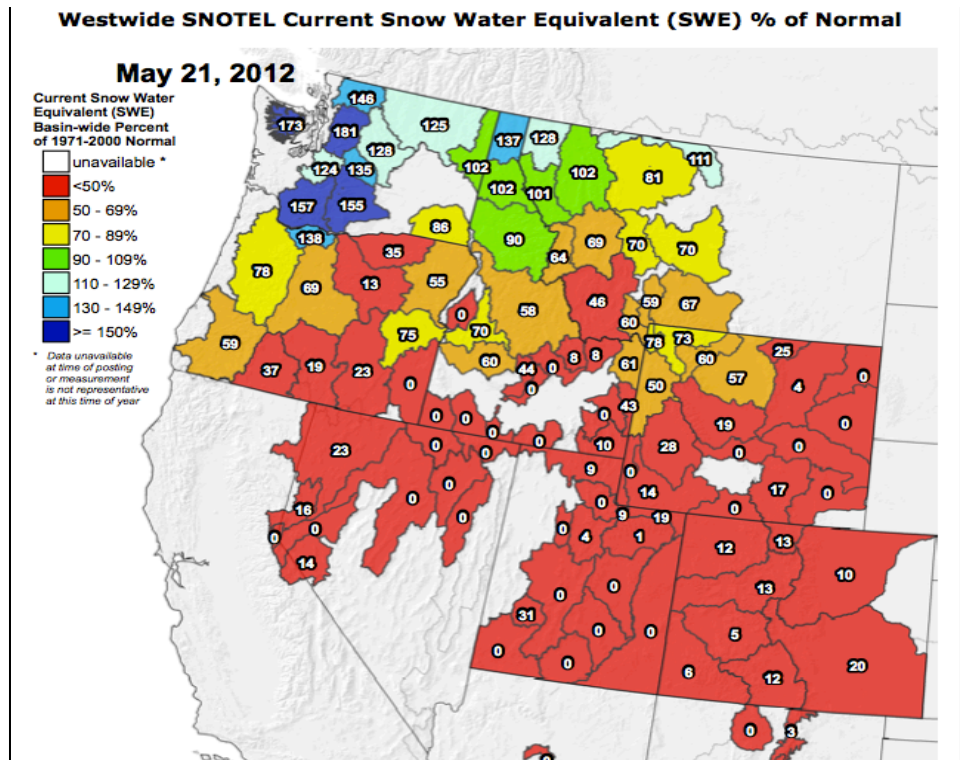


Fig. 4: Basin snow water equivalent (SWE) as a percent of average.

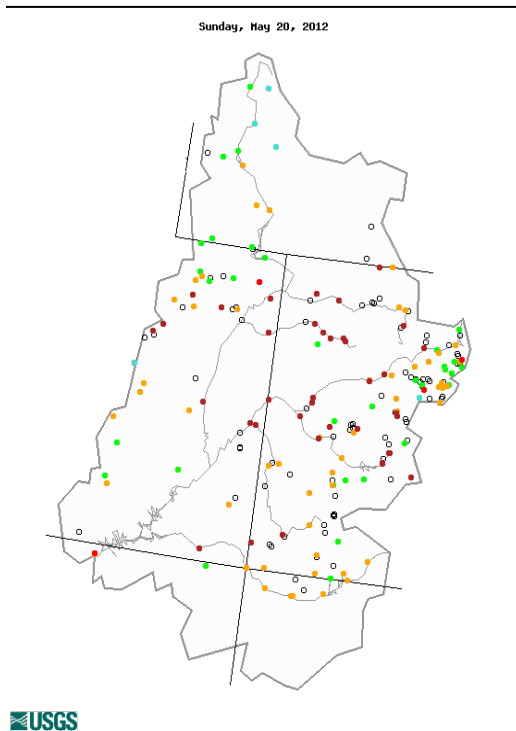
Water-year-to-date (WYTD), SNOTEL precipitation percentiles are lowest for the Yampa and Gunnison basins in CO, with many sites reporting in the lowest 5th percentile or below (Fig. 3). The Wasatch range in UT and the northern mountains of CO are also dry, with most precipitation percentiles in the teens. SNOTEL percentiles in the Upper Green basin in WY are generally above the 40th percentile. In the San Juan basin, many SNOTEL percentiles are above the 30th percentile, but there are also several SNOTEL sites reporting below the 30th percentile.

Snowpack conditions around the UCRB are all well below average and many sites have completely melted out (Fig. 4). This is a combined result of less than average seasonal snowpack accumulations and much earlier melting (seasonal peaks one month earlier than normal). Nearly all of the sub-basins are below 20% of average. The lowest averages are in eastern UT where little to no snow remains. In the northern-most part of the UCRB in WY, one sub-basin is recording 28% of average snowpack.

Streamflow

As of May 20th, 30% of the USGS streamgages in the UCRB recorded normal (25th – 75th percentile) or above normal 7-day average streamflows (Fig. 5). Only 4% of the gages in the basin are recording above normal flows, while about 70% of the gages in the basin are recording below normal flows. Many of the gages on the San Juan and Dolores rivers are below normal while many of the gages on the Colorado, Gunnison, Yampa, and White Rivers are much below normal. Gages on the Upper Green River are mixed between normal and below normal flows. Near normal flows are mainly confined to the Upper Green River basin and around the Colorado headwaters.

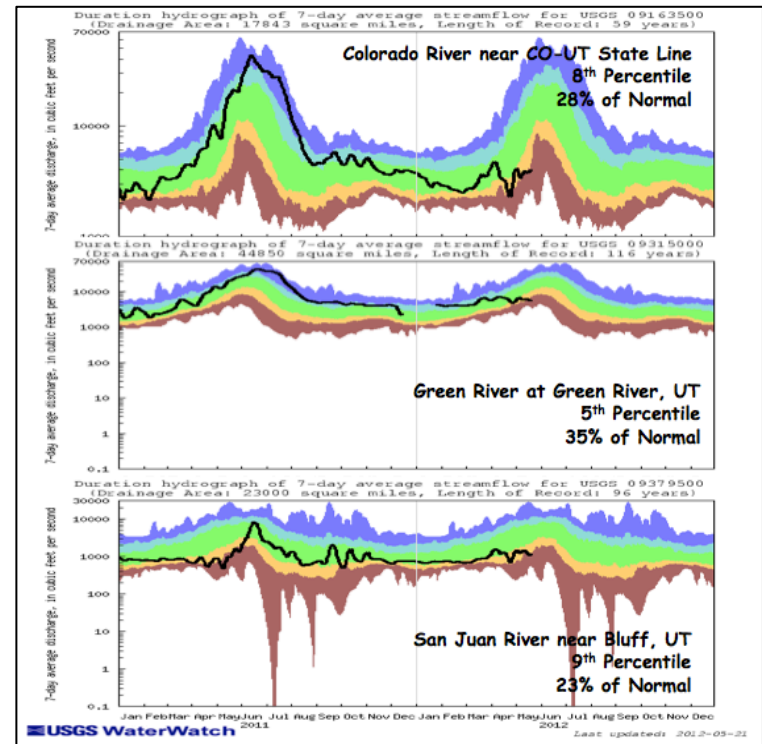
Flows on three key gages in the UCRB have decreased over the past week and are now reporting much below normal flows (Fig. 6). Flows on the Colorado River near the CO-UT state line, the Green River at Green River, UT, and the San Juan River near Bluff, UT are currently at the 8th, 5th, and 9th percentiles, respectively.



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 May 20th.

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



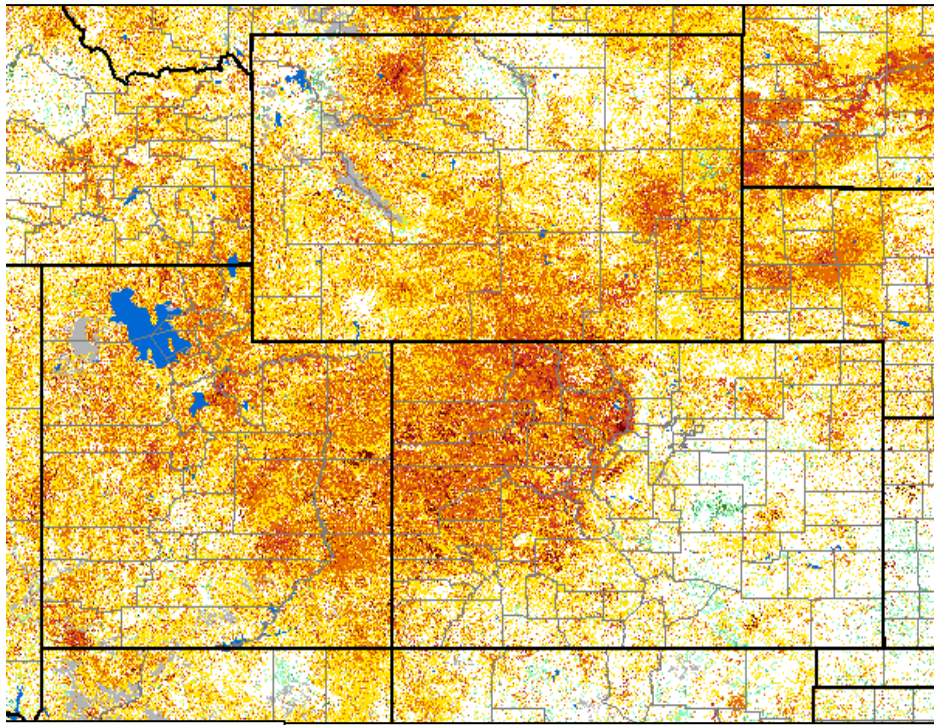
Water Supply and Demand

Most of the UCRB experienced temperatures about 4 to 8 degrees above average for the week. All of eastern CO also experienced warmer than average temperatures last week. The VIC model shows extremely dry soil moisture conditions for almost all of the UCRB. Very dry soils in the lowest 5th percentile are modeled in western CO, eastern UT, and much of southern WY. Dry soils are also evident through much of northeast and southeast CO. Satellite vegetation conditions show the driest vegetation over northwest CO with slightly better (but still dry) conditions over southwest WY, the Four Corners region, and northeast CO (Fig. 7)

All of the reservoirs above Lake Powell are currently near or above their May storage averages. Flaming Gorge and Blue Mesa have seen storage volume decreases since the beginning of the month. All other reservoirs have seen volume increases in May, though increases are generally less than the normally large increases that are observed this time of year. Lake Powell is currently at 79% of average and 64% of capacity (compared to 56% of capacity at the same time one year ago). Daily inflows into the major reservoirs in the basin are much below average for this time of year.

Precipitation Forecast

A high pressure ridge currently over the UCRB will begin to weaken today and allow a Pacific trough to advance eastward over the great basin. Moisture will gradually increase on Wednesday following the passage of a strong cold front and lead to scattered showers developing from northwest to southeast. Precipitation amounts will remain light, with the best chances confined to the mountains of southeast Wyoming and northern Colorado. A second disturbance is then expected to quickly move across the basin during the weekend, again favoring the northern half of the basin with the largest accumulations. Rainfall totals will general remain between 0.25 and 0.5 inches of liquid over areas north of I-70 with the far northwestern portions of the UCRB receiving upwards of 0.75 inches by Sunday (Fig. 8). Meanwhile, expect southwestern parts of the basin to remain mostly dry through the period with gusty winds and slightly above average temperatures.



- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-Drought
- Normal
- Slightly Moist
- Very Moist
- Extremely Moist
- Water
- Out of Season

Fig. 7: eMODIS VegDRI satellite vegetation conditions as of May 20th.

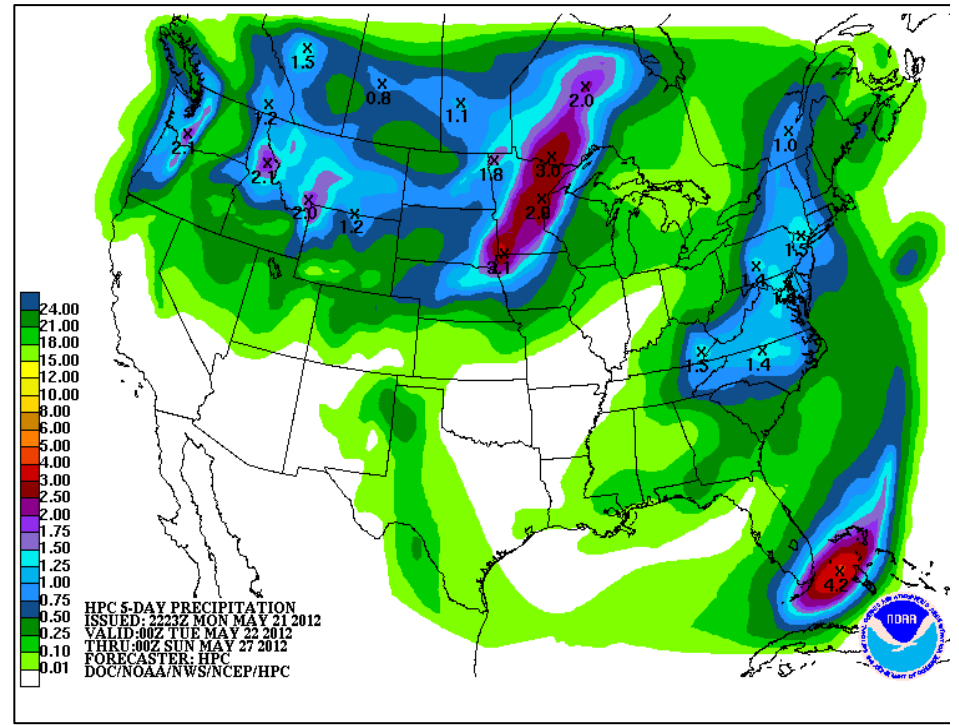
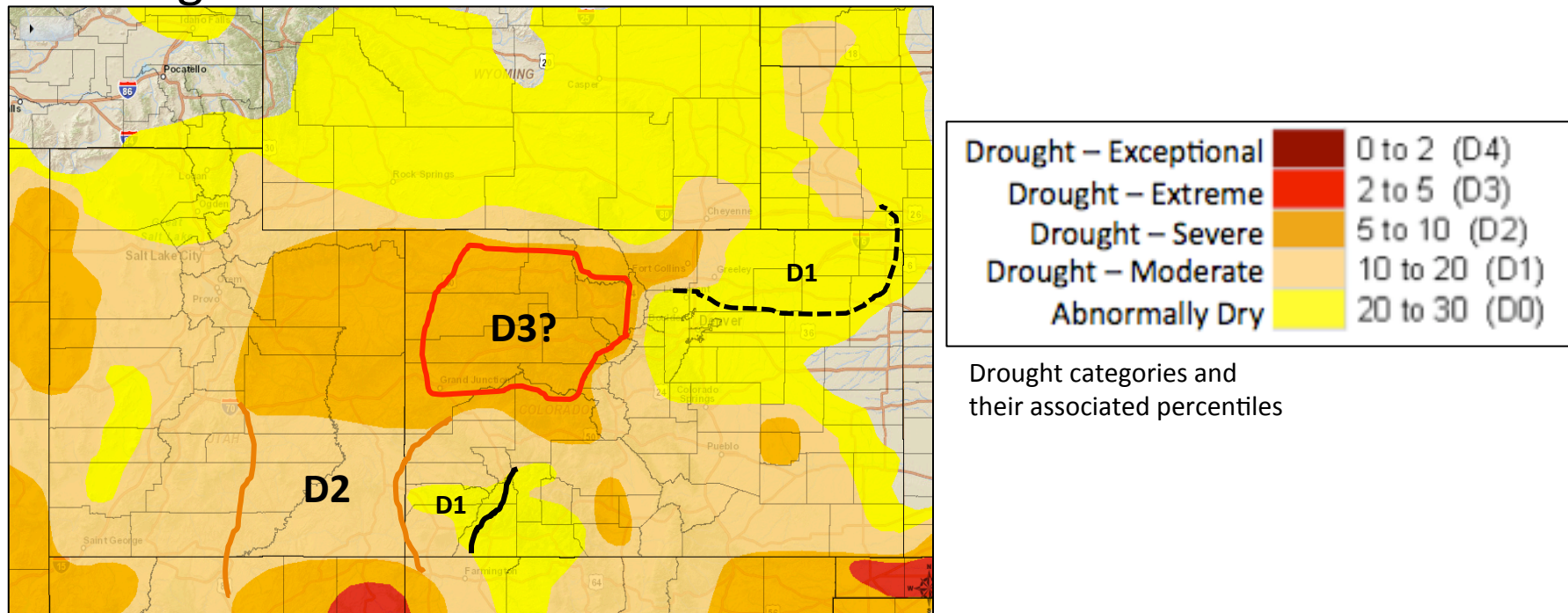


Fig. 8: Hydrologic Prediction Center's Quantitative Precipitation Forecast (QPF) through 00UTC Sunday.

Drought and Water Discussion



Drought categories and their associated percentiles

Fig. 9: May 15th release of U.S. Drought Monitor for the UCRB.

Several changes are recommended for the current U.S. Drought Monitor (USDM) map depiction (Fig. 9). In northeast CO, a D1 expansion is recommended (Fig. 9, dashed black line). Though precipitation SPIs are not indicative of deteriorations, local reports on the ground are poor crop conditions and little benefit from recent moisture. D1 is drawn to match with VegDRI vegetation conditions and should extend to northern CO border. We defer to the author and other local experts on resolving those lines in WY/NE.

In the southern portion of the UCRB, a D1 expansion is recommended in southwest CO (Fig. 9, solid black line), and a D2 expansion is recommended for southeast UT (Fig. 9, orange lines). This will connect the D2 in northeast UT with the D2 in northeast Arizona, and will cover the region that shows SPIs below -1.5 on the 90-day timescale. This will also cover the Colorado River all the way down to Lake Powell where streamflows are around or below the 10th percentile.

Drought and Water Discussion

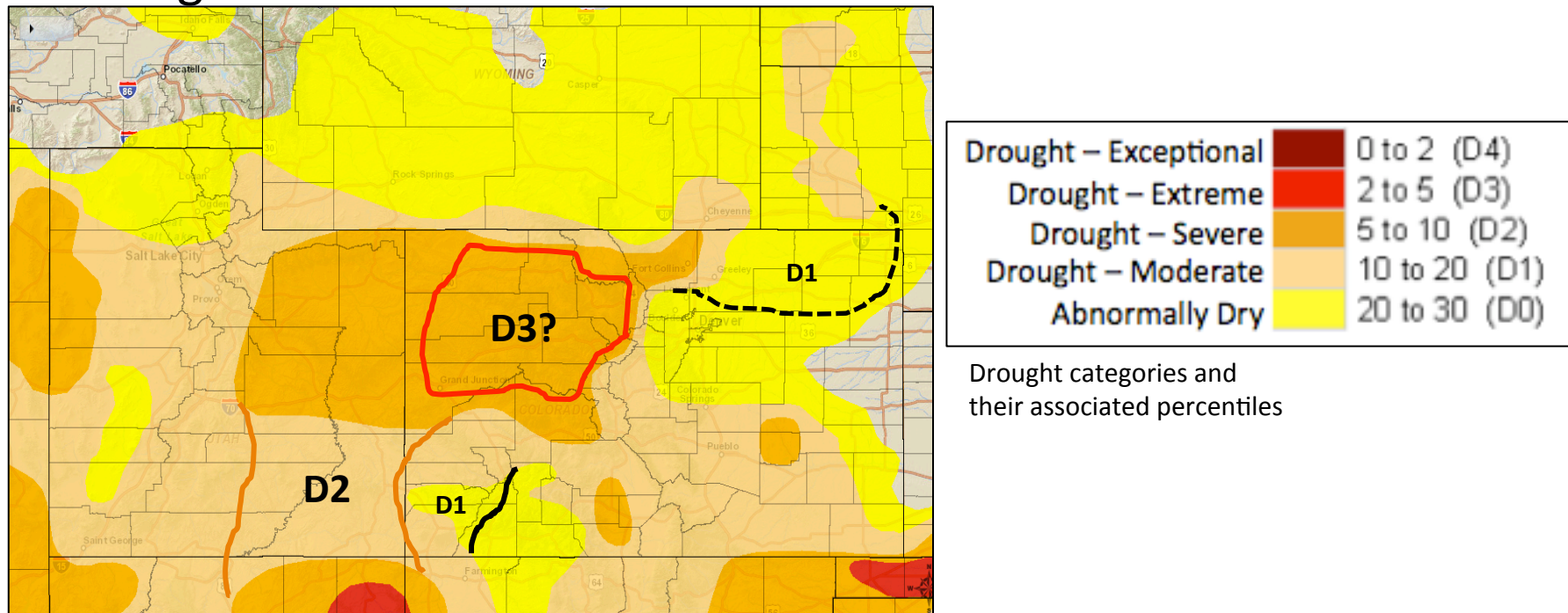


Fig. 9: May 15th release of U.S. Drought Monitor for the UCRB.

The final recommendation is for the introduction of D3 into northwest CO (Fig. 9, red line). This drawn D3 delineation covers all SNOTEL precipitation percentiles that are below the 5th percentile, and contours with the extremely dry vegetation conditions depicted in VegDRI (Fig. 7). There is still disagreement as to whether D3 should be introduced or not. There have been reports on the ground that there is less green-up than what is normally observed at this time of year, a larger number of wildfires than normal, and very dry soils. Some report that these conditions are the worst they have seen. Snowpack in the region accumulated to peaks similar to 2002 peaks and began melting a month earlier than normal. SNOTEL WYTD precipitation are less than the 5th percentile at two-thirds of the sites in the area. However, some argue that impacts at this time are still limited, water supply is in good condition, and we should wait to introduce D3 until we see how peak streamflows will respond. Because a disagreement remains, we will defer to the current USDM author on whether to introduce D3 or not and how exactly to delineate.