Spring 2011

Weekly Climate, Water & Drought Assessment

Today's Agenda

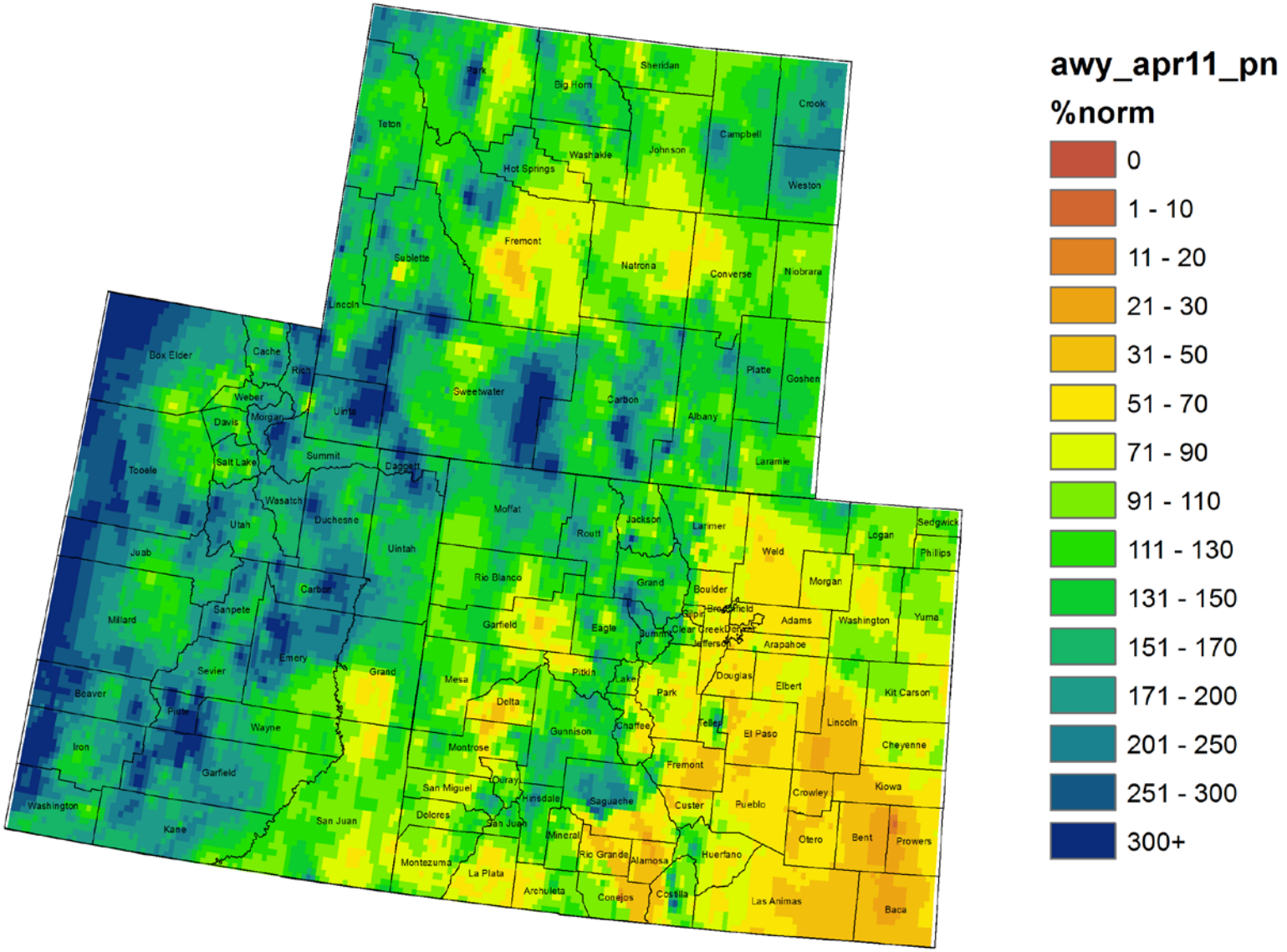
-Assessment of current water conditions

- Precipitation Forecast

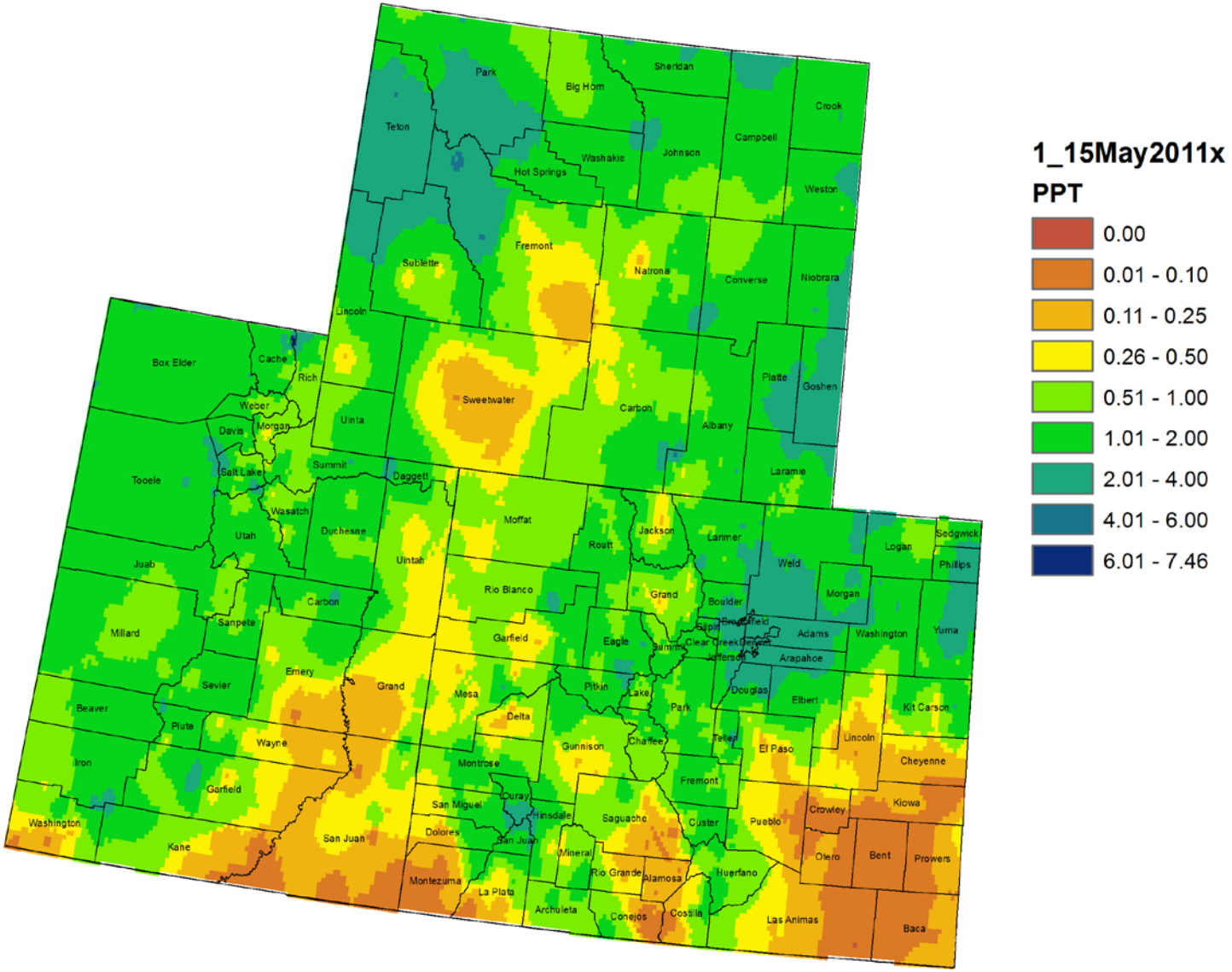
- Recommendations for Drought Monitor

Precipitation/Snowpack Update

Colorado, Utah and Wyoming Water Year 2011
Precipitation as Percentage of Normal
(Oct 10 - Apr 11)



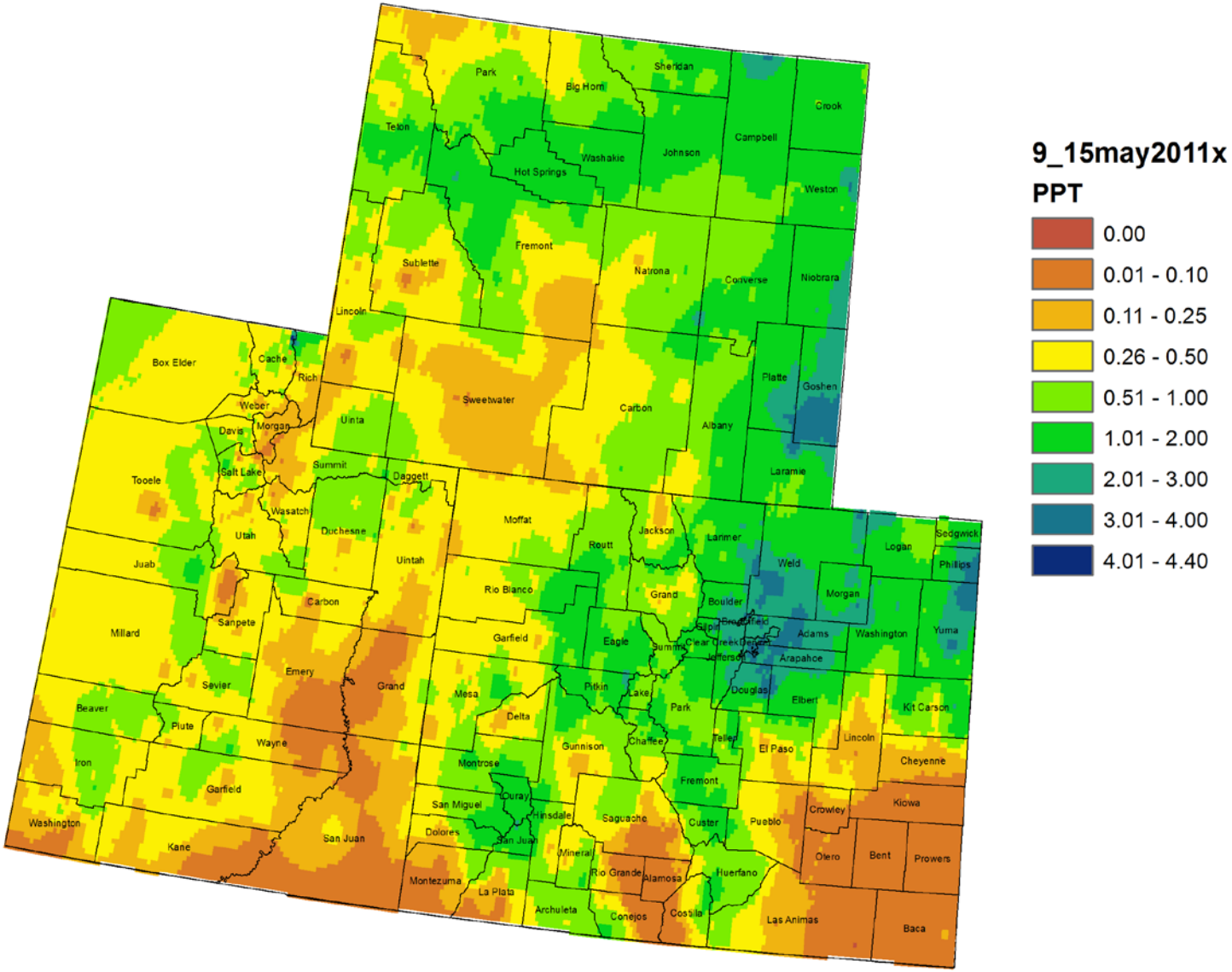
Colorado, Utah and Wyoming May Precipitation (in)
1 - 15 May 2011



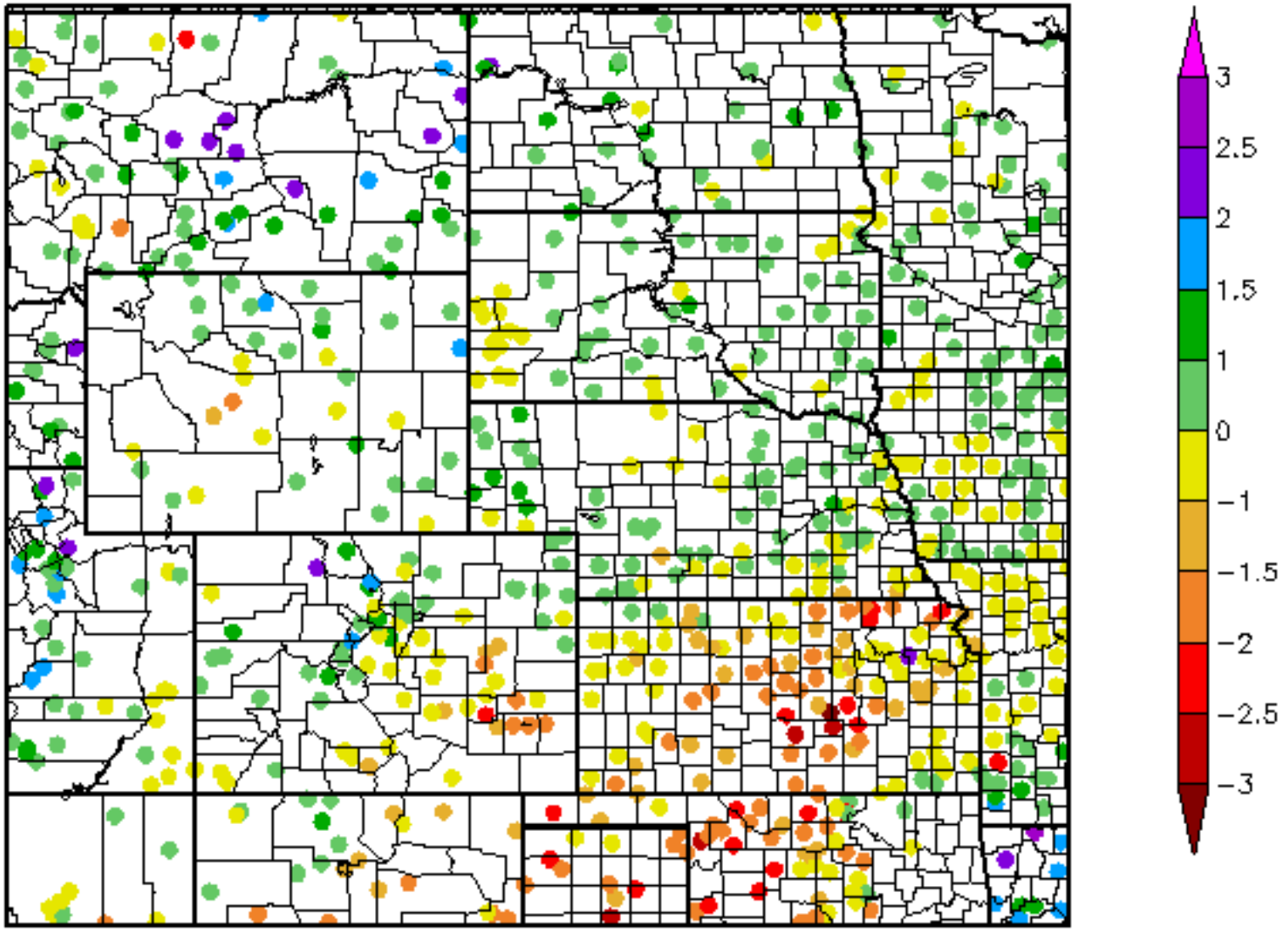
1_15May2011x
PPT

0.00
0.01 - 0.10
0.11 - 0.25
0.26 - 0.50
0.51 - 1.00
1.01 - 2.00
2.01 - 4.00
4.01 - 6.00
6.01 - 7.46

Colorado, Utah and Wyoming 7 Day Precipitation (in)
9 - 15 May 2011



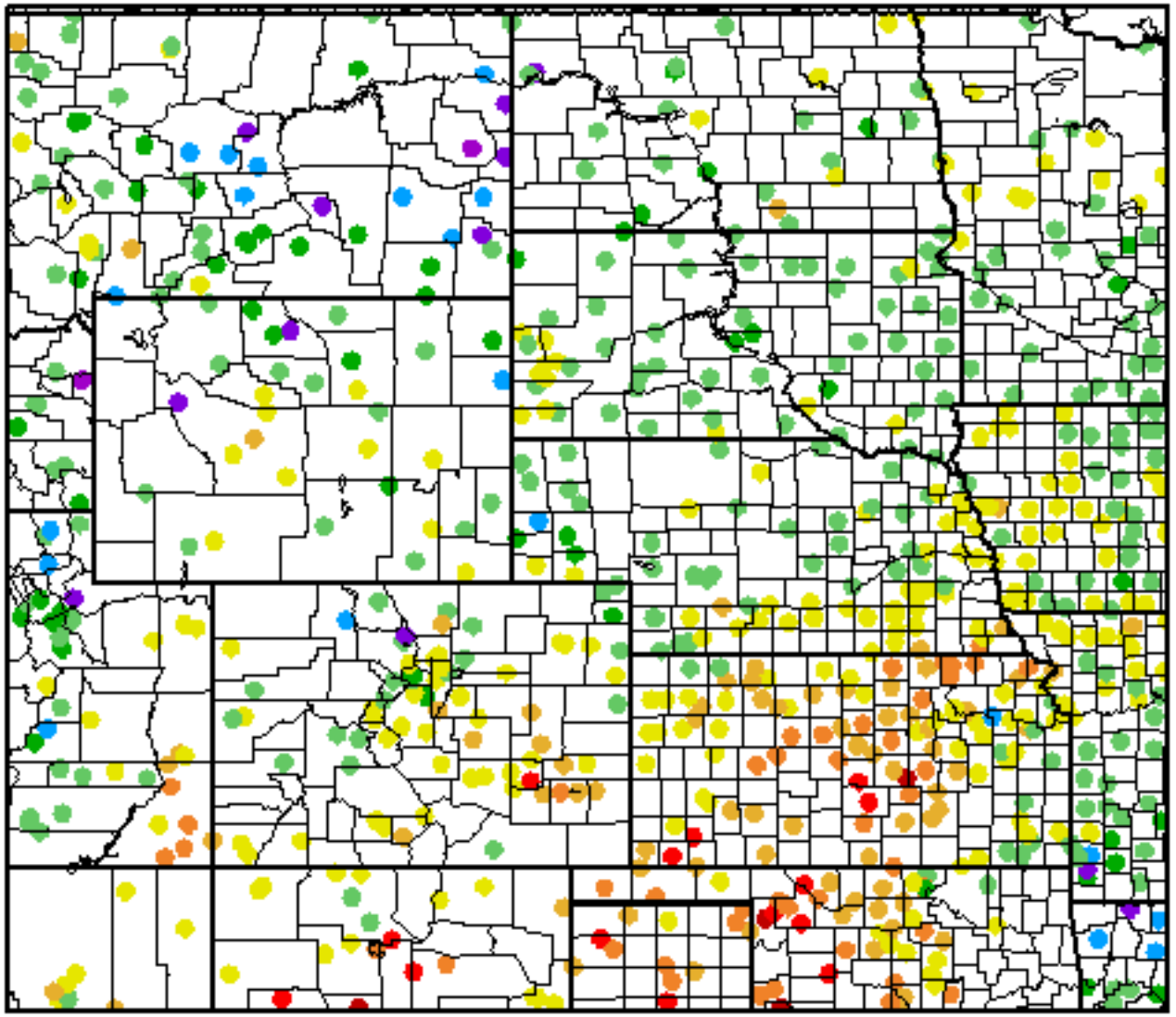
60 Day SPI
3/18/2011 – 5/16/2011



Generated 5/17/2011 at HPRCC using provisional data.

Regional Climate Centers

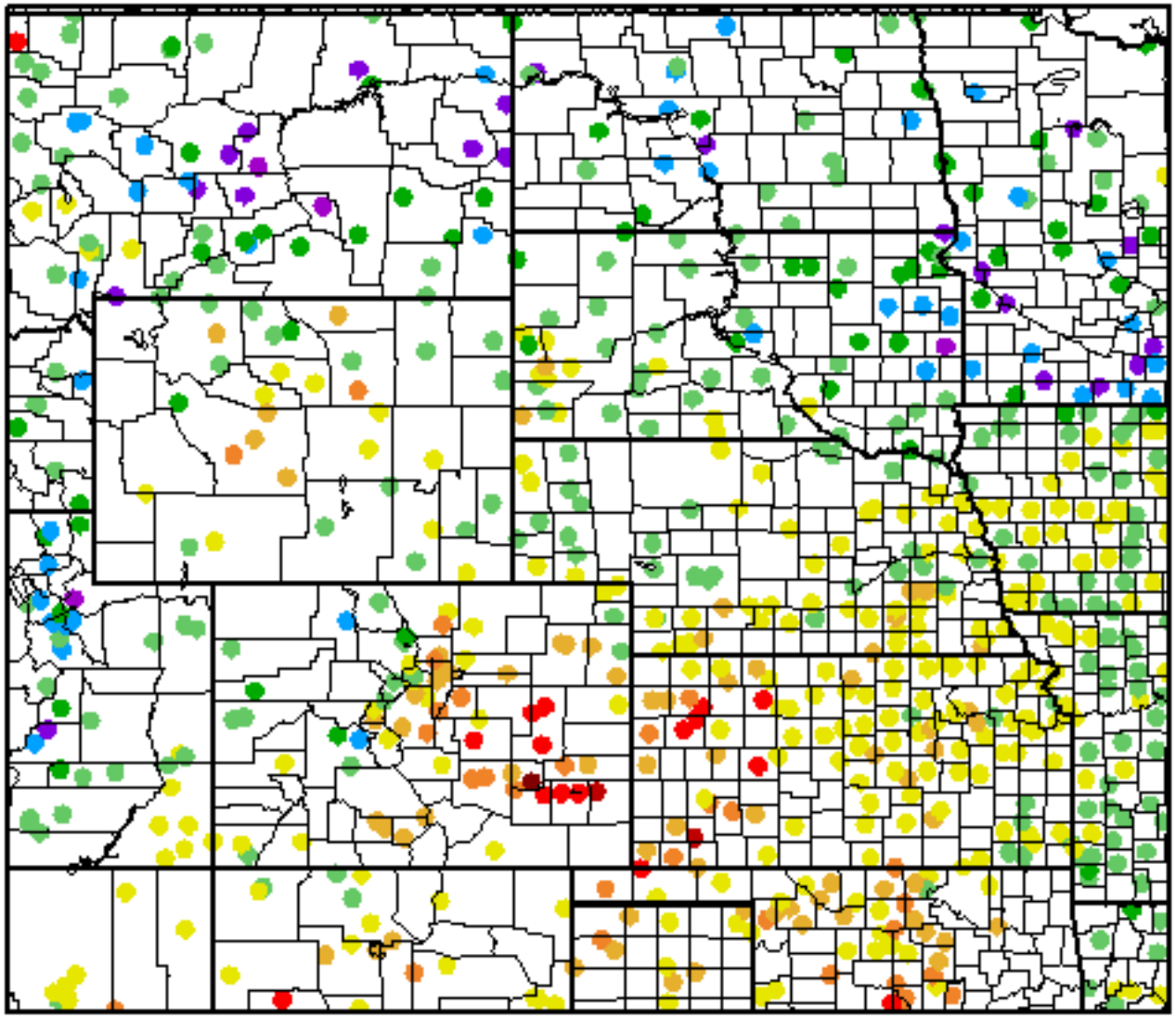
120 Day SPI
1/17/2011 – 5/16/2011



Generated 5/17/2011 at HPRCC using provisional data.

Regional Climate Centers

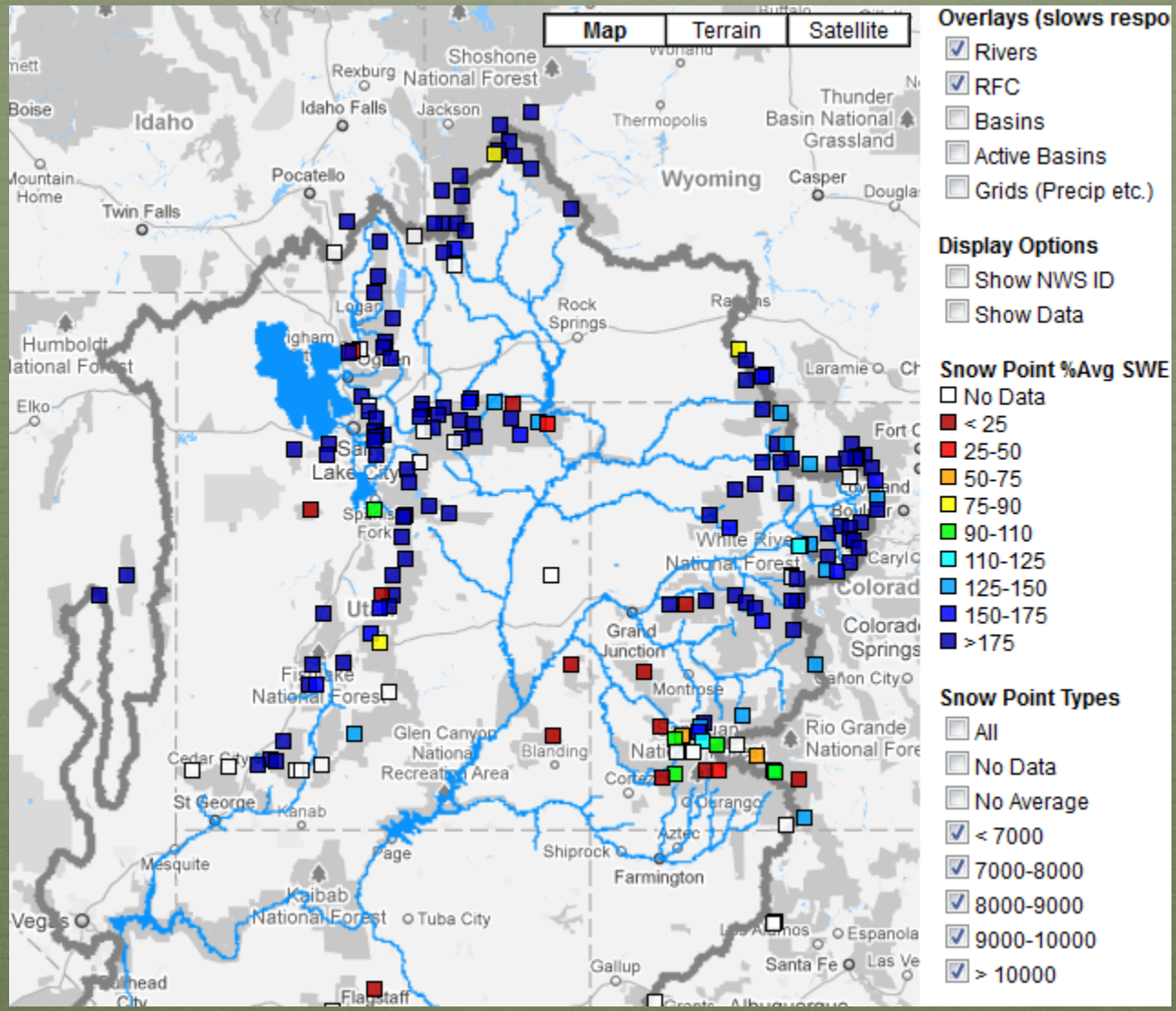
9 Month SPI
8/17/2010 – 5/16/2011



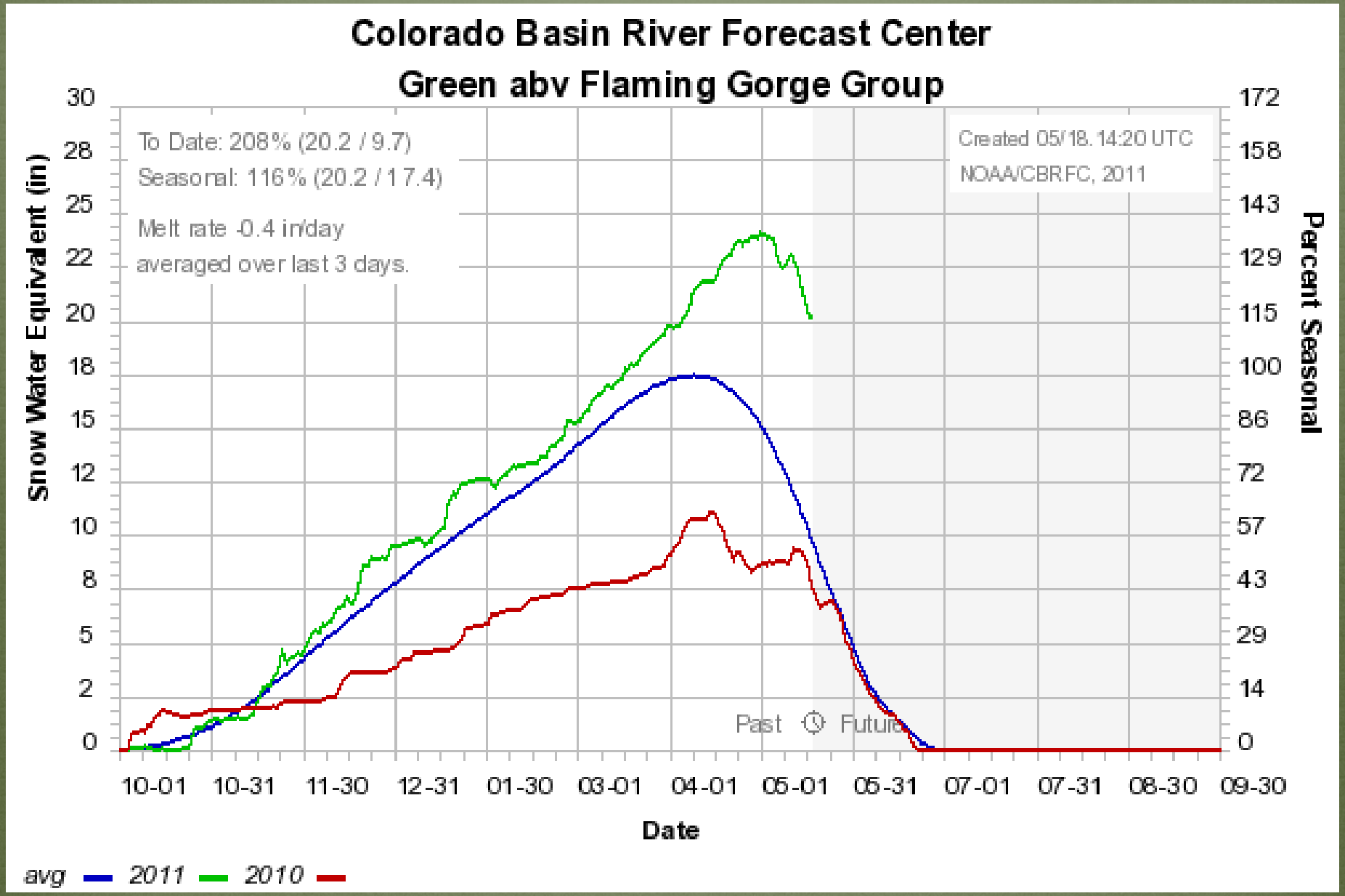
Generated 5/17/2011 at HPRCC using provisional data.

Regional Climate Centers

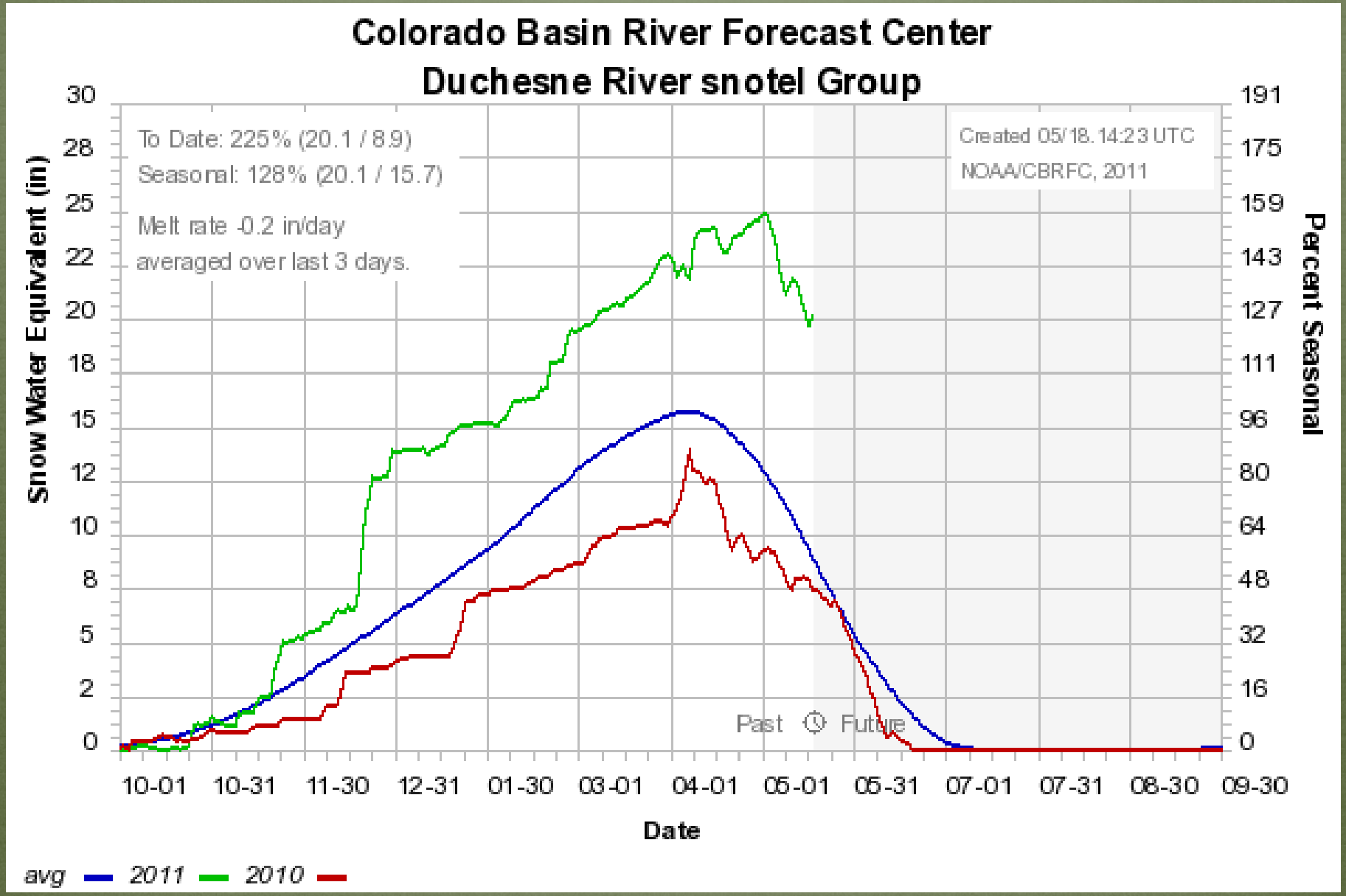
Upper Colorado River Basin Snow



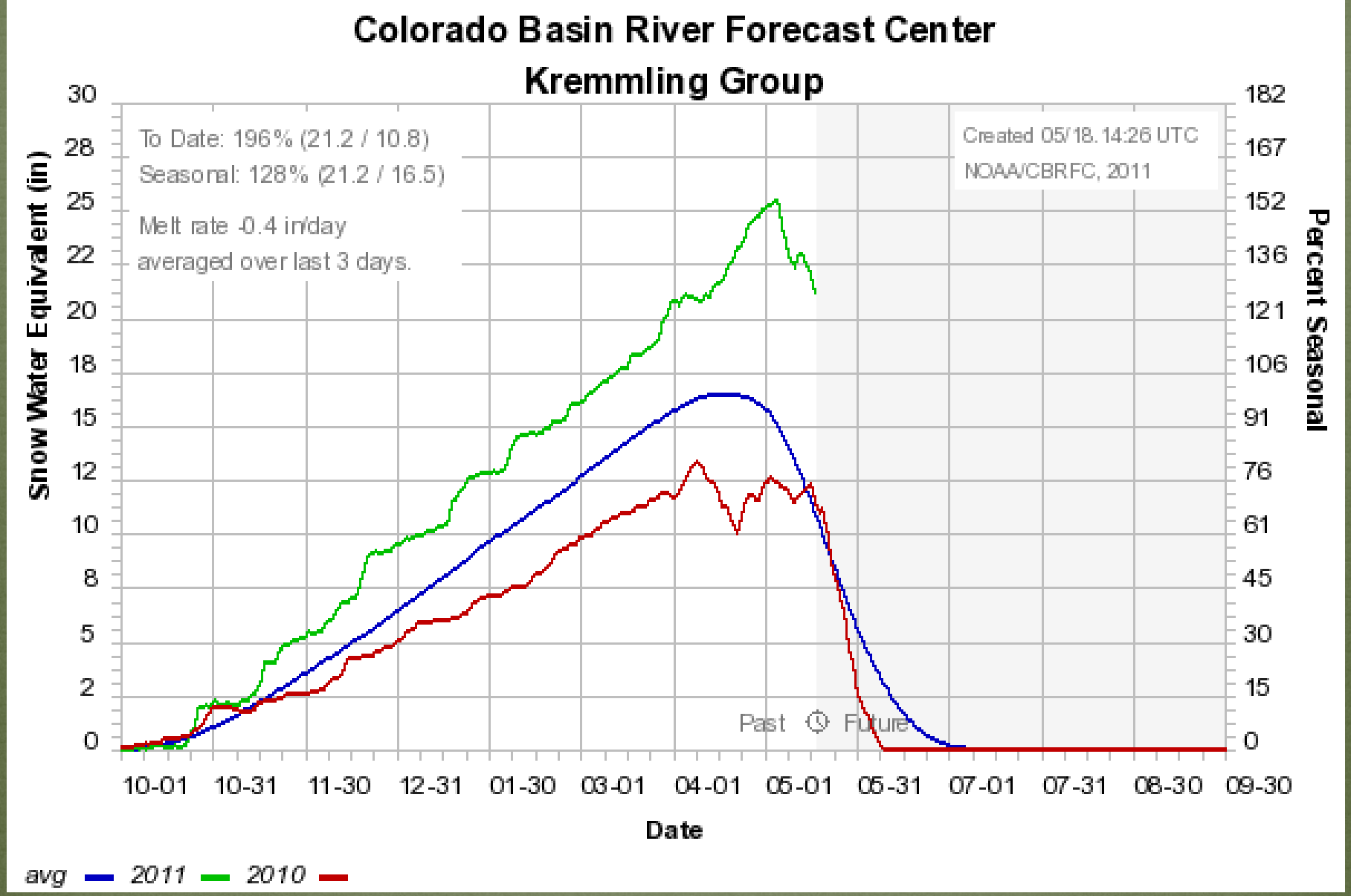
NATIONAL WEATHER SERVICE
Colorado Basin River Forecast Center



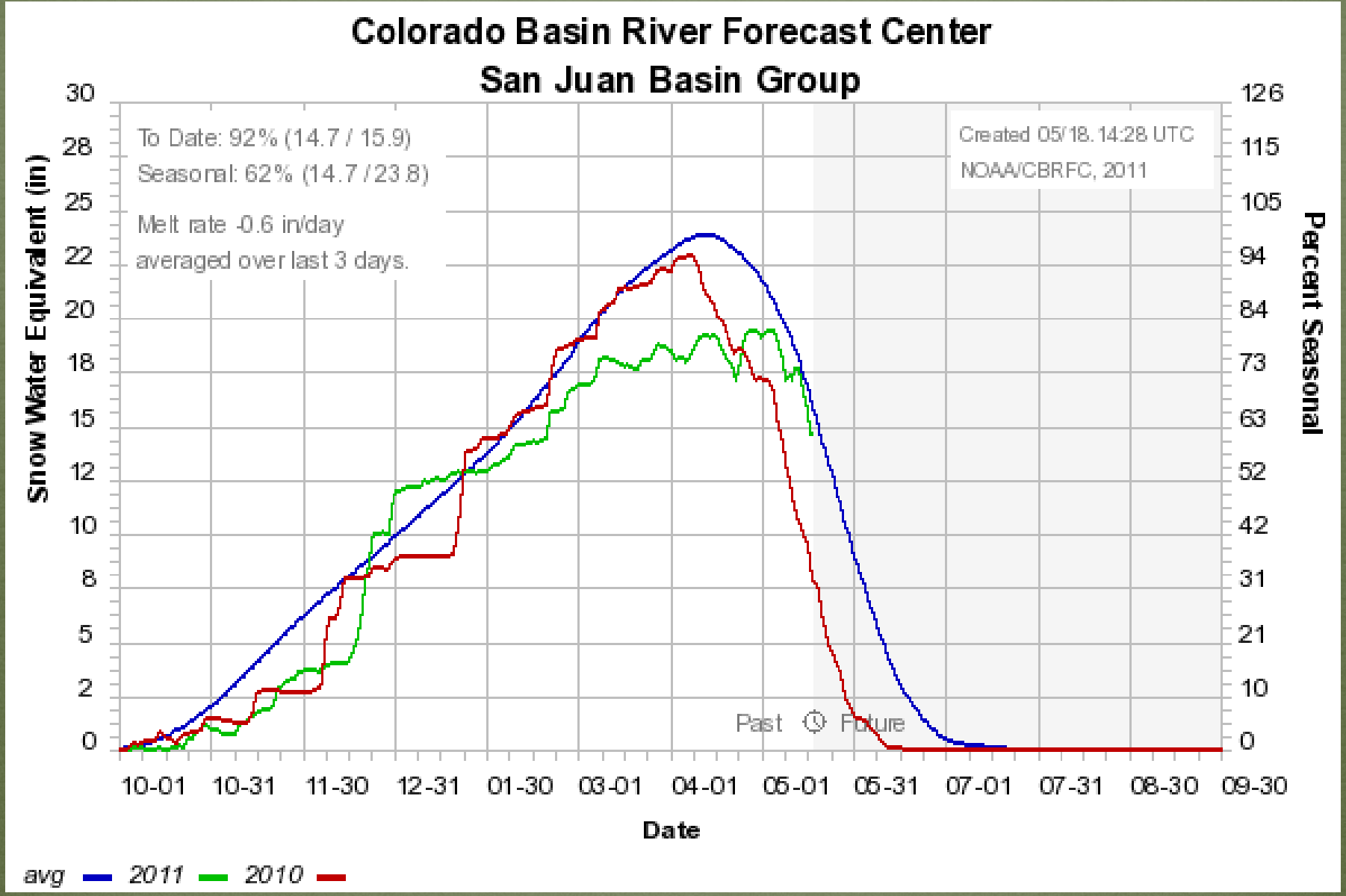
Snowpack % of average to date: 208%
Percent of average peak: 116%



Snowpack % of average to date: 225%
Percent of average peak: 128%



Snowpack % of average to date: 196%
Percent of average peak: 128%

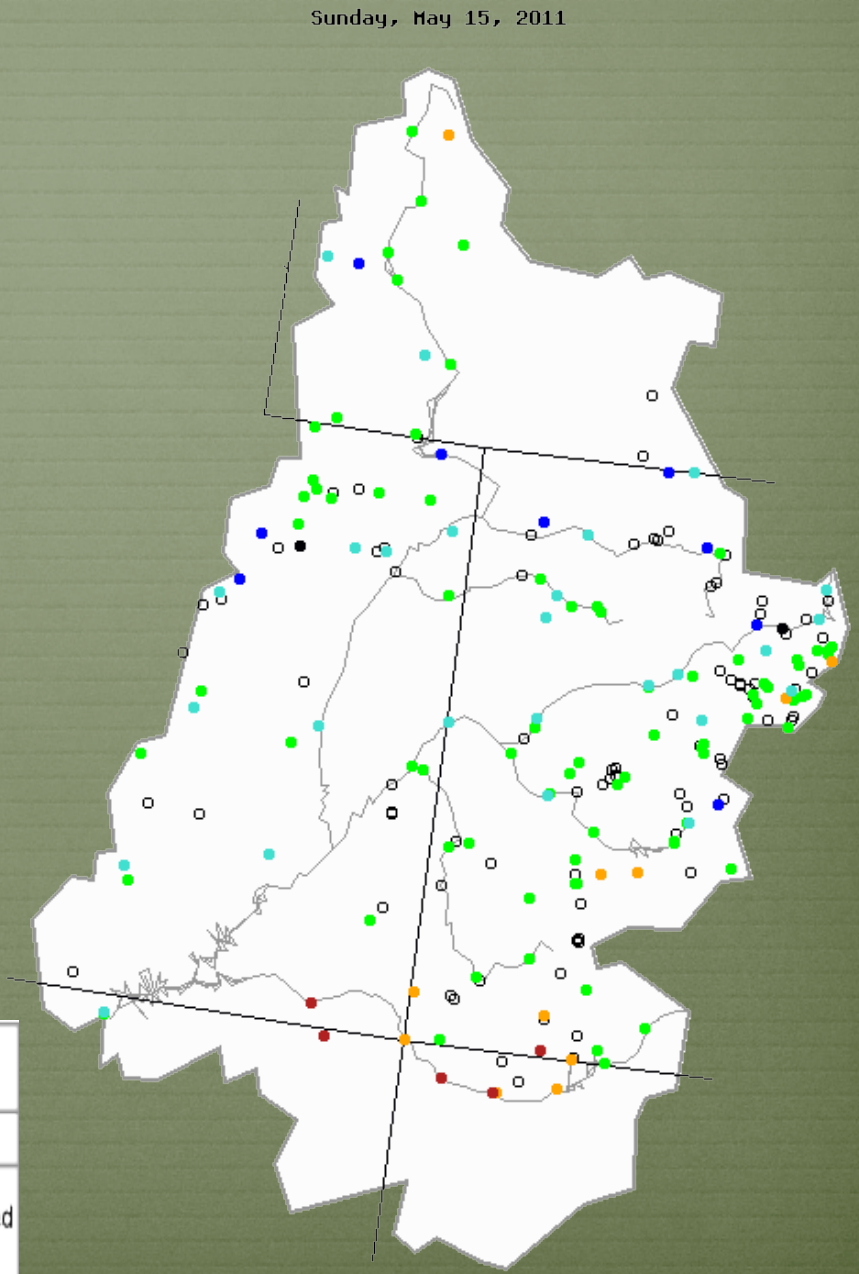


Snowpack % of average to date: 92%
Percent of average peak: 62%

Streamflow Update

Michael Lewis USGS

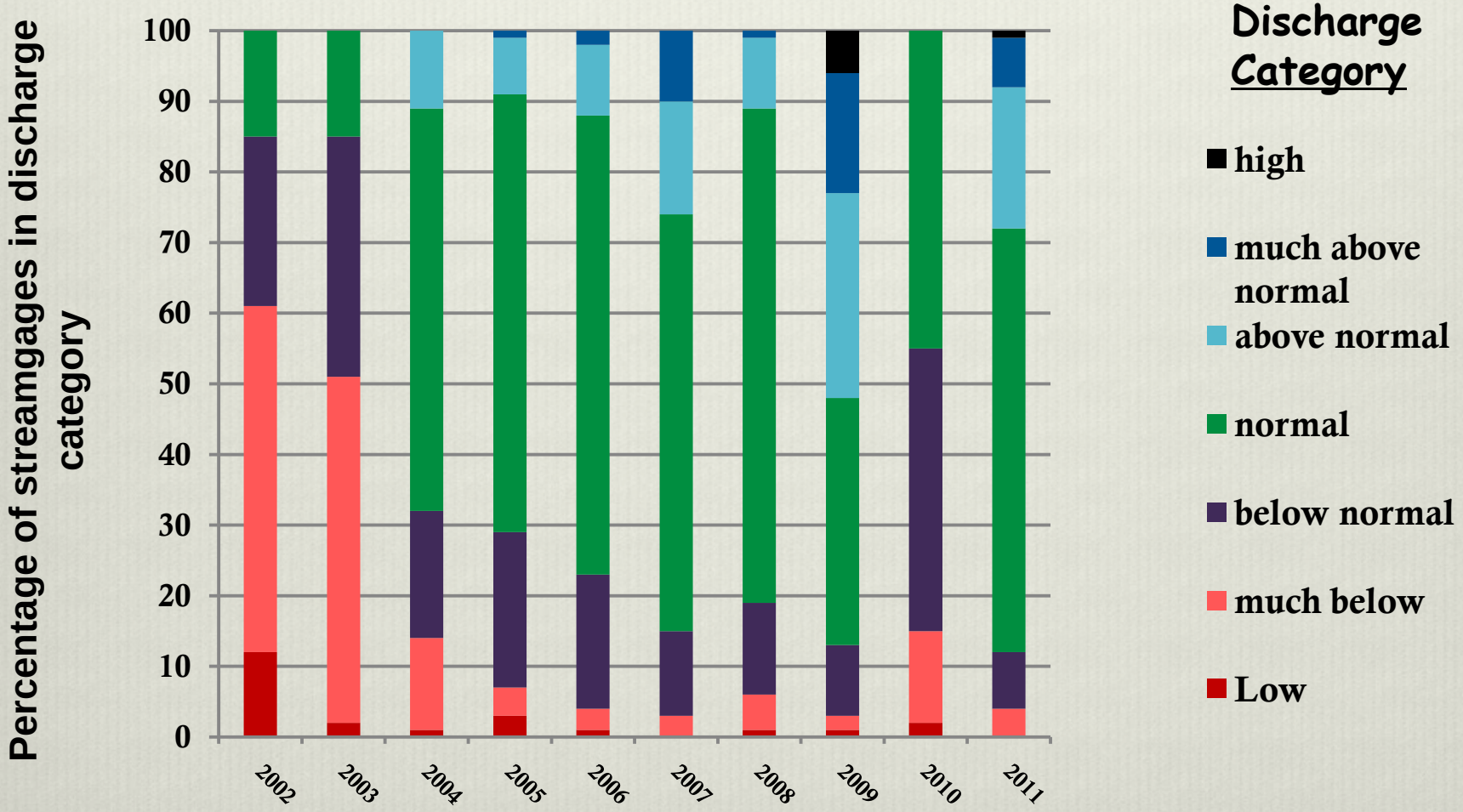
7-day average discharge compared to historical discharge for the day of the year (May 15th)



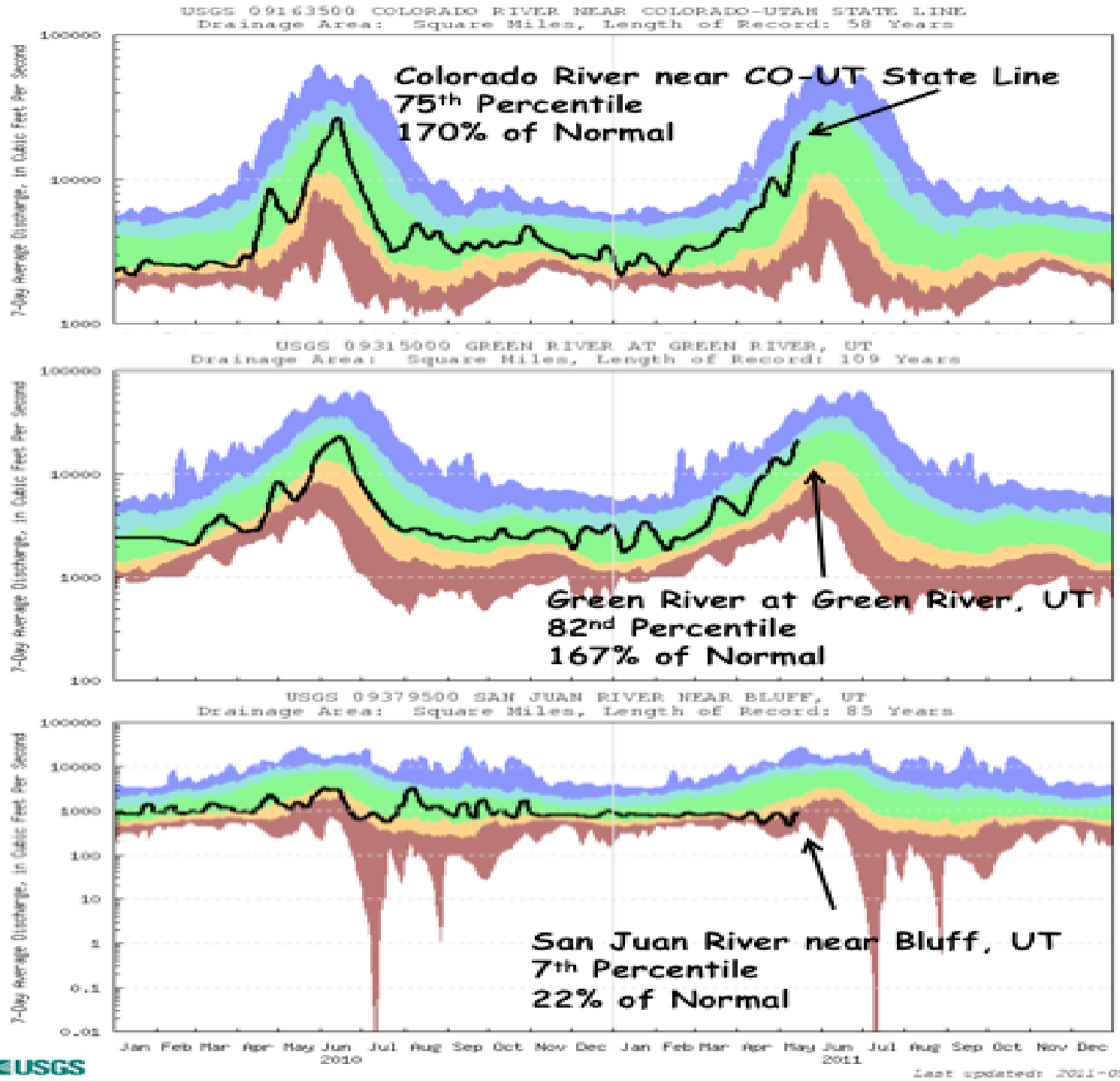
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

USGS

-Upper Colorado River Basin- Comparison of 7-day Average Discharge For May 15, 2002-2011

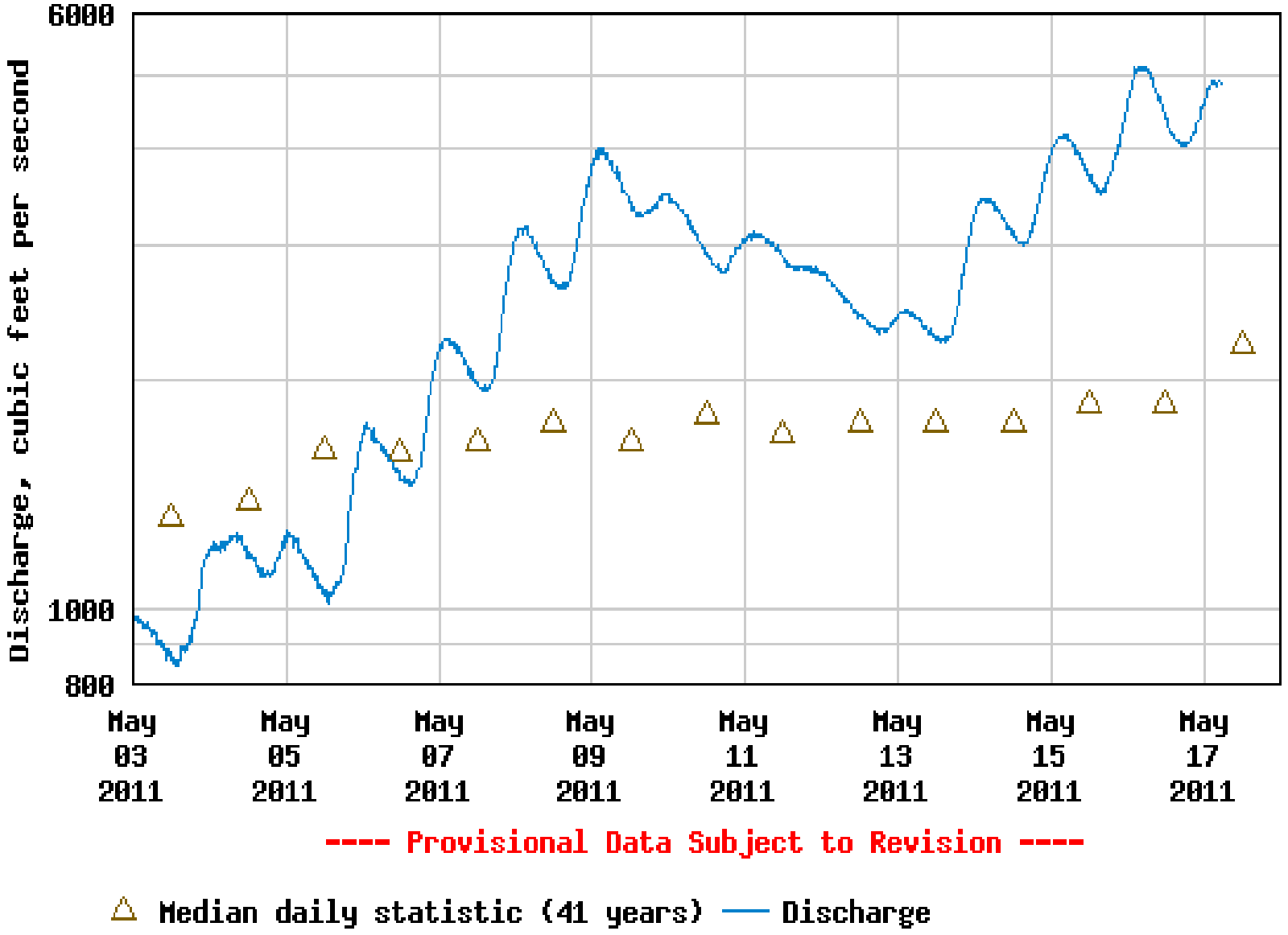


USGS


USGS 09163500 COLORADO RIVER NEAR COLORADO-UTAH STATE LINE
Drainage Area: Square Miles, Length of Record: 58 Years
7-Day Average Discharge, in Cubic Feet Per Second
1000000
100000
10000
1000
Colorado River near CO-UT State Line
75th Percentile
170% of Normal
USGS 09315000 GREEN RIVER AT GREEN RIVER, UT
Drainage Area: Square Miles, Length of Record: 109 Years
7-Day Average Discharge, in Cubic Feet Per Second
1000000
100000
10000
1000
100
Green River at Green River, UT
82nd Percentile
167% of Normal
USGS 09379500 SAN JUAN RIVER NEAR BLUFF, UT
Drainage Area: Square Miles, Length of Record: 85 Years
7-Day Average Discharge, in Cubic Feet Per Second
1000000
100000
10000
1000
100
10
1
0.1
0.01
San Juan River near Bluff, UT
7th Percentile
22% of Normal
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2010
2011
USGS
Last updated: 2011-03-17

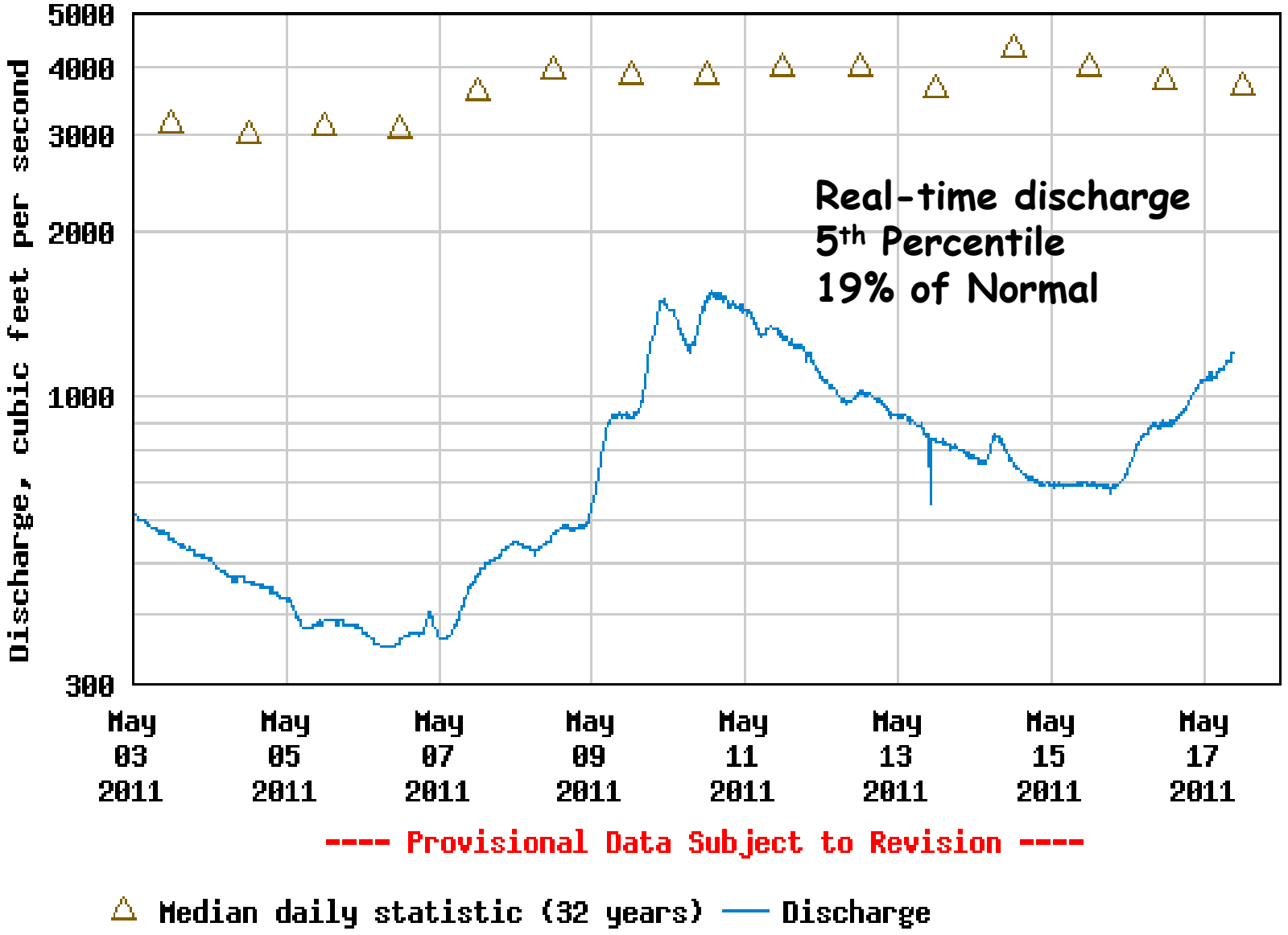
USGS

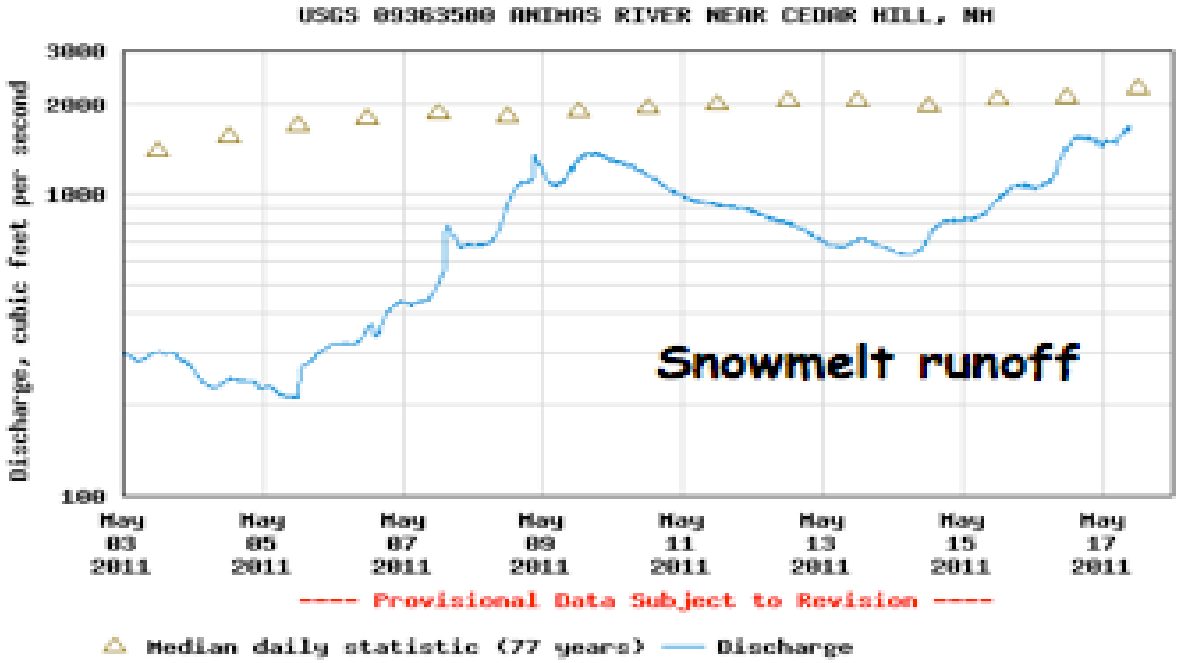
USGS 09242500 ELK RIVER NEAR MILNER, CO.

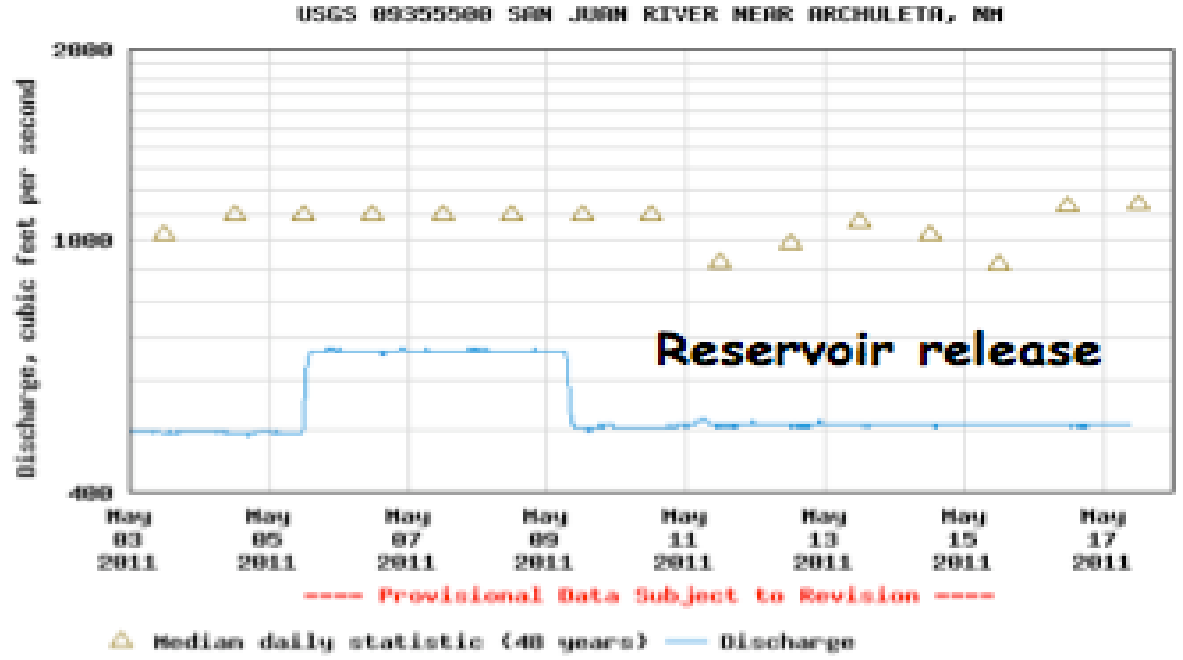


USGS

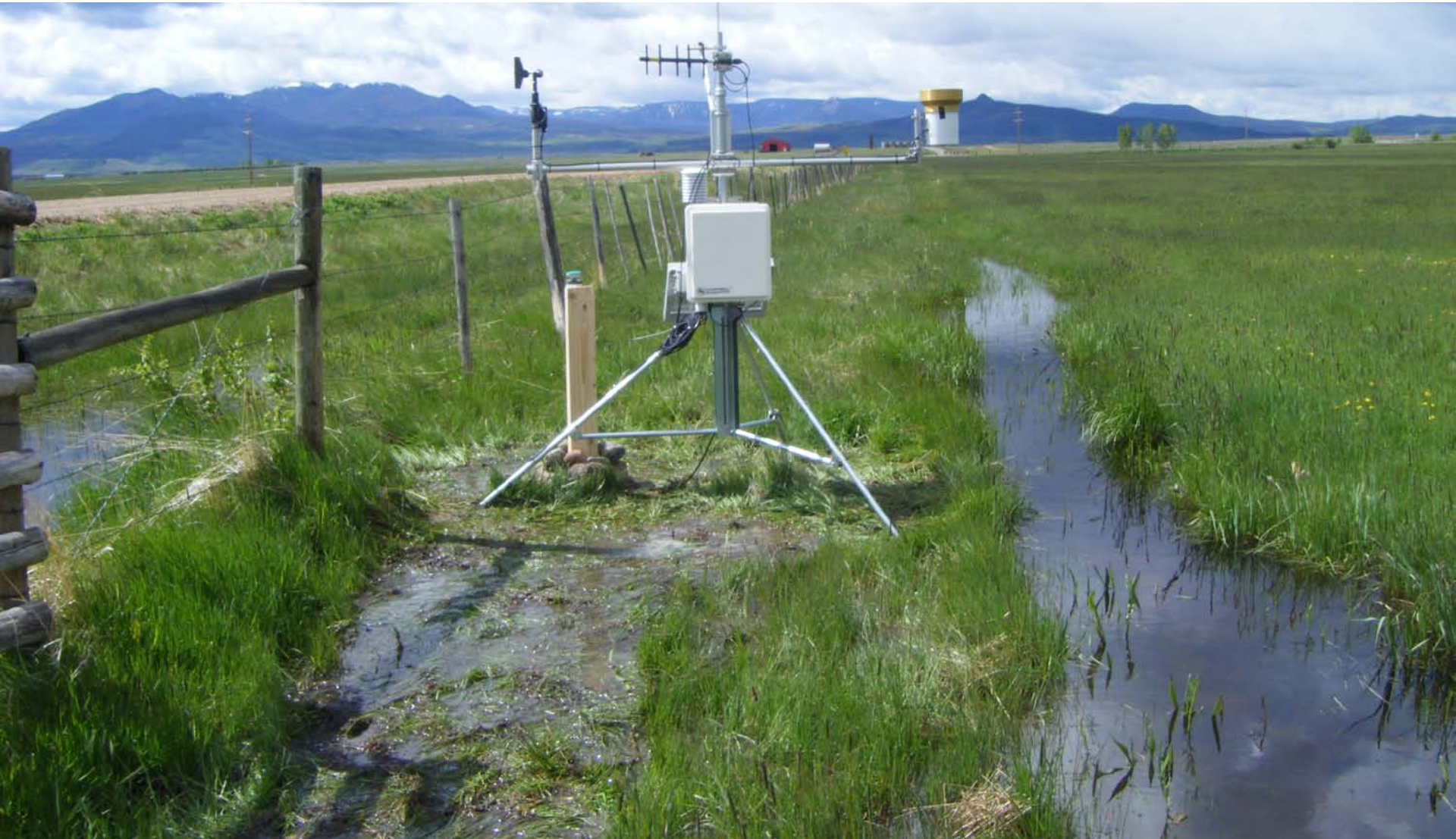
USGS 09371010 SAN JUAN RIVER AT FOUR CORNERS, CO



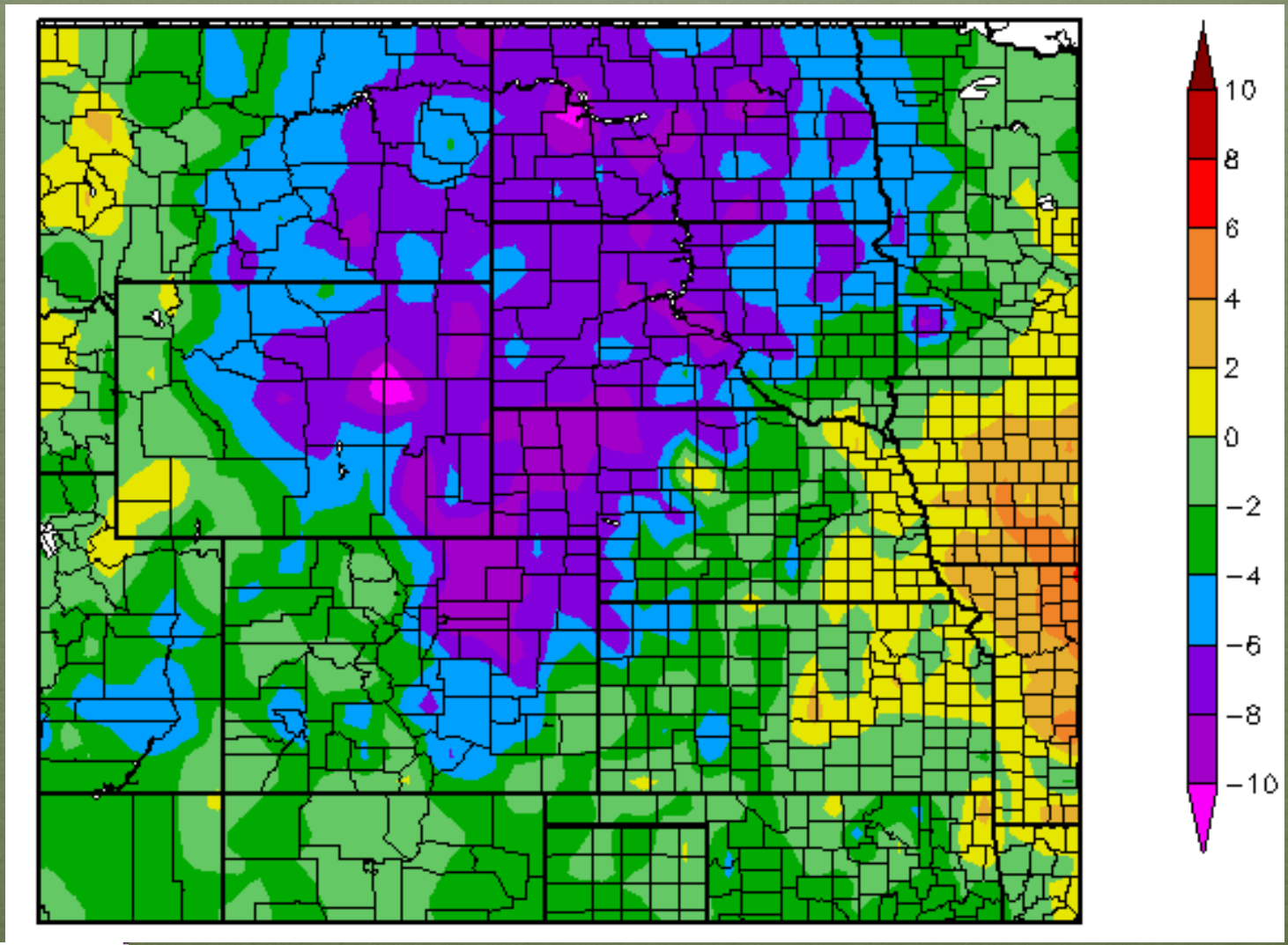

USGS 09363500 ANIMAS RIVER NEAR CEDAR HILL, NM
Discharge, cubic feet per second
3000
2000
1000
100
Snowmelt runoff
May 03 2011
May 05 2011
May 07 2011
May 09 2011
May 11 2011
May 13 2011
May 15 2011
May 17 2011
---- Provisional Data Subject to Revision ----
Median daily statistic (77 years)
Discharge


USGS 09355500 SAN JUAN RIVER NEAR ARCHULETA, NM
Discharge, cubic feet per second
2000
1000
400
Reservoir release
May 03 2011
May 05 2011
May 07 2011
May 09 2011
May 11 2011
May 13 2011
May 15 2011
May 17 2011
---- Provisional Data Subject to Revision ----
Median daily statistic (40 years)
Discharge

Water Demand

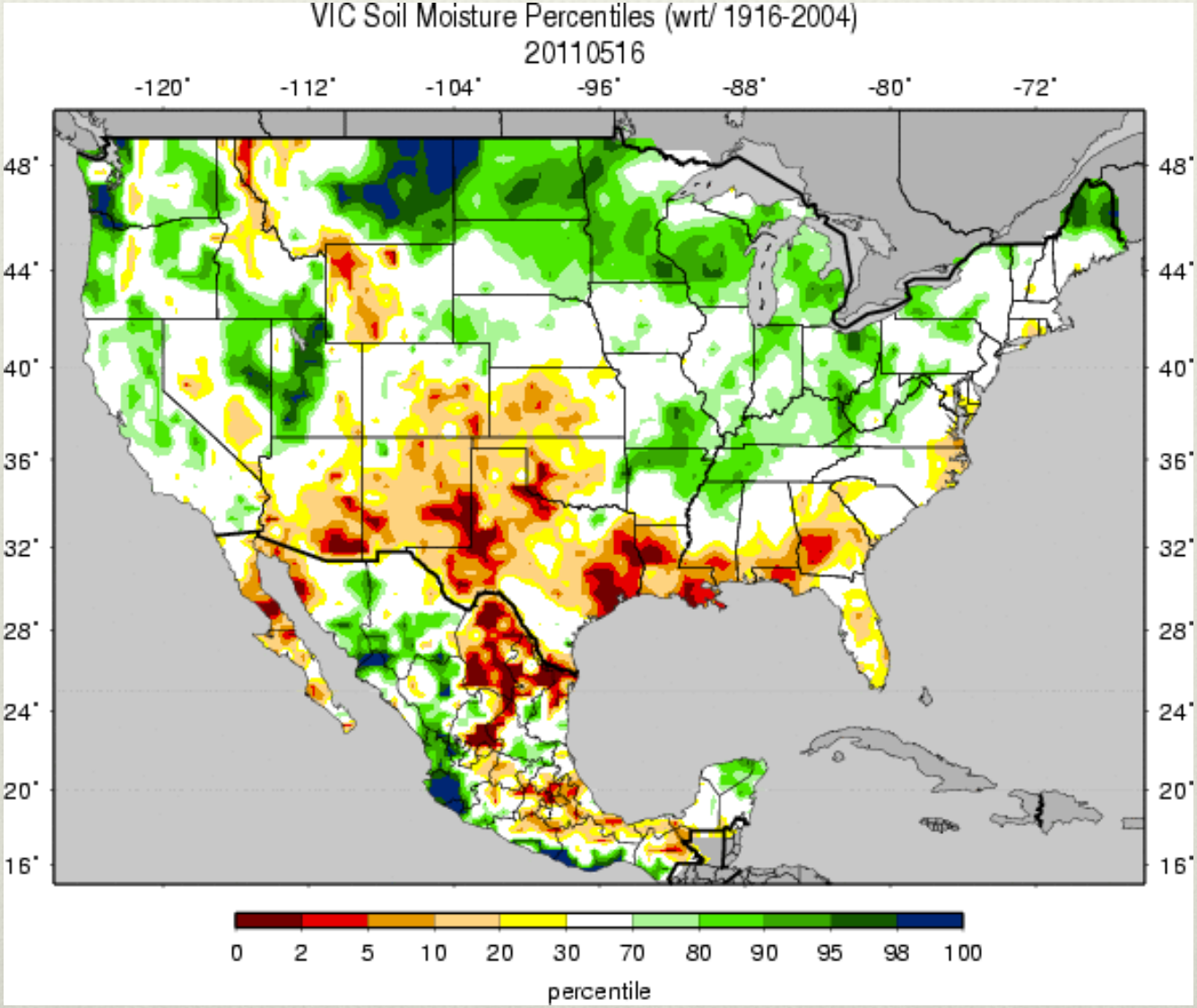


Temperature Departure from Normal
05/10/2011 – 05/16/2011



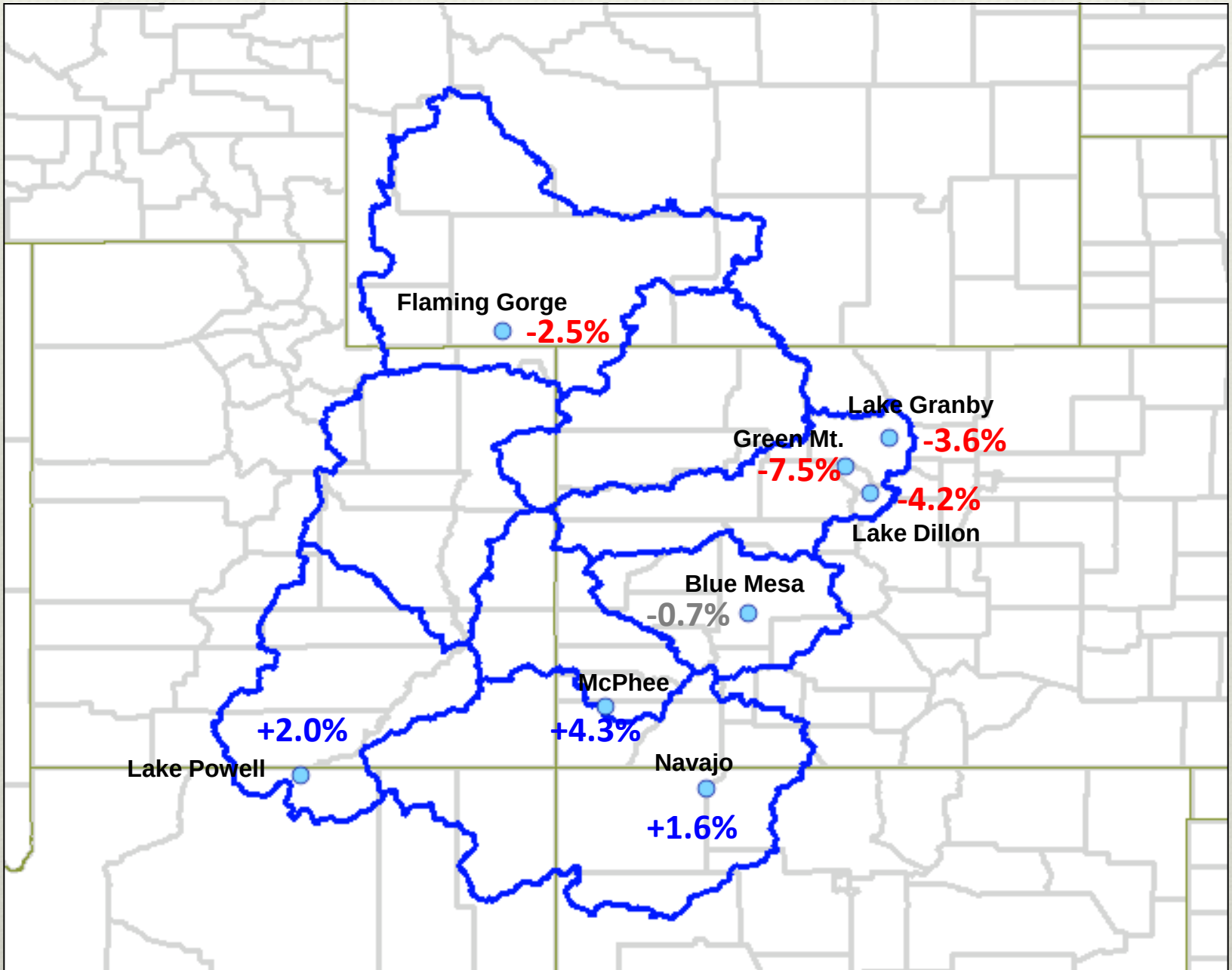
High Plains Regional Climate Center

VIC Soil Moisture
16 May 2011

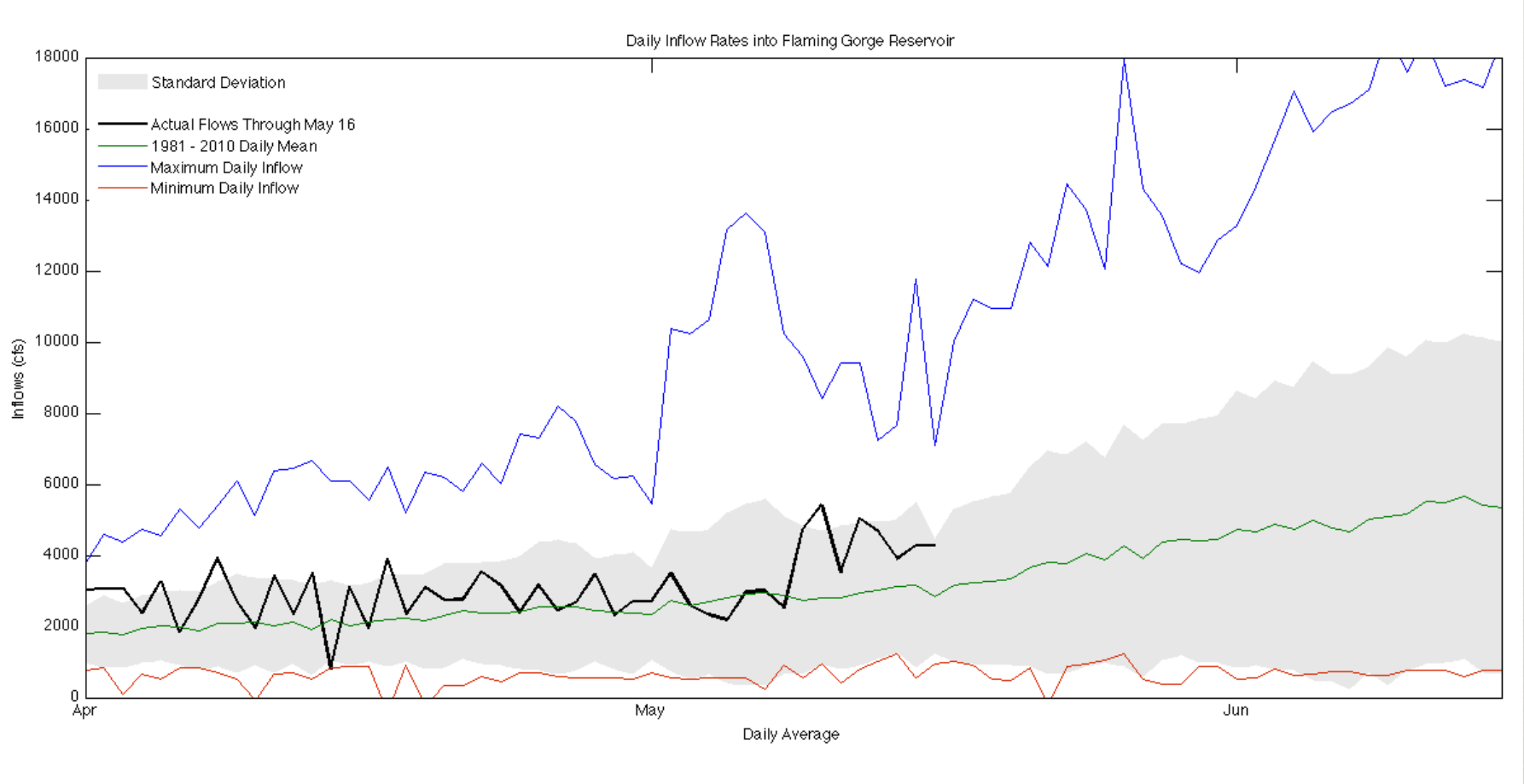


Reservoir Update

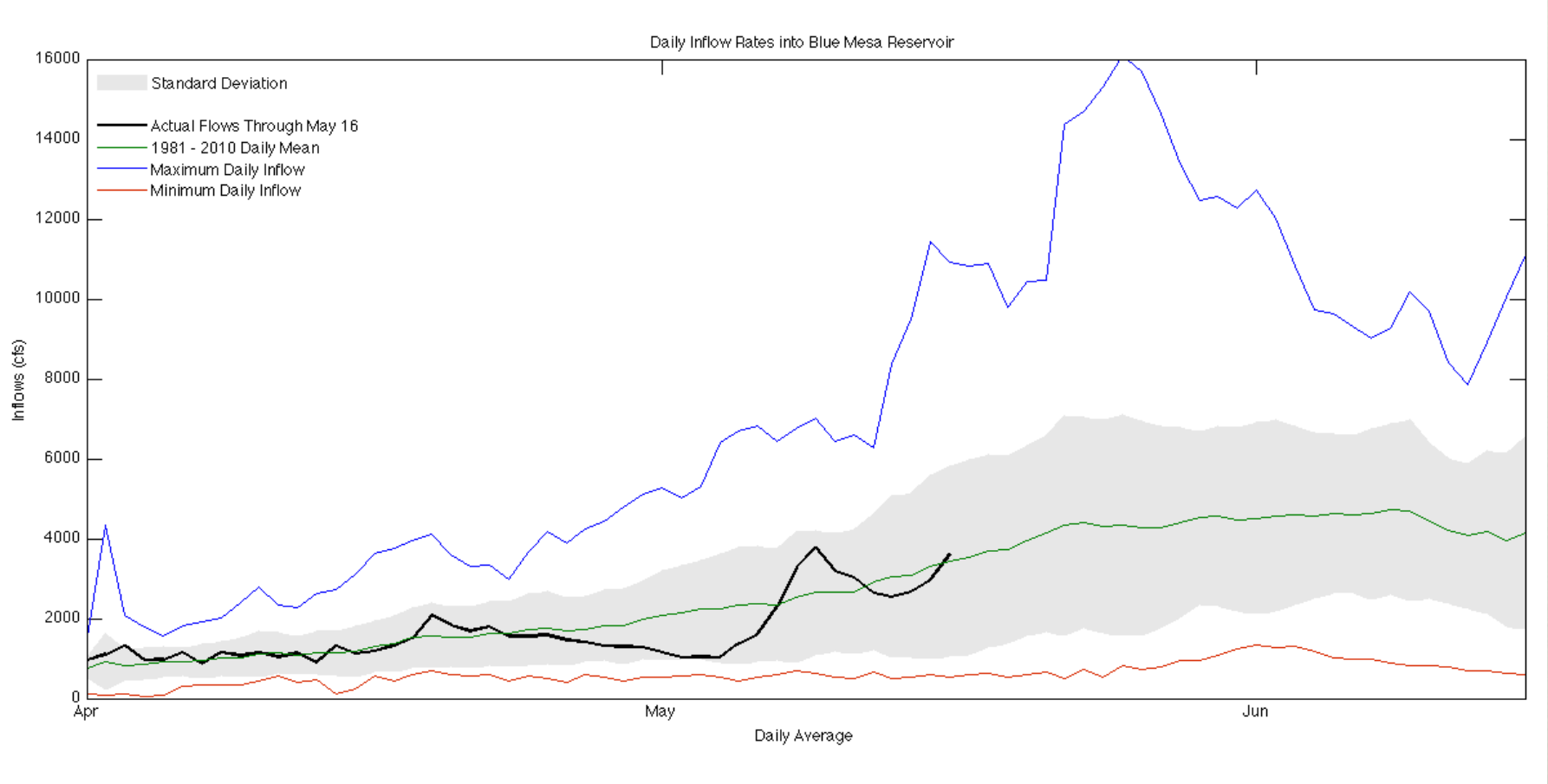
Reservoir Level Month-to-Date Change



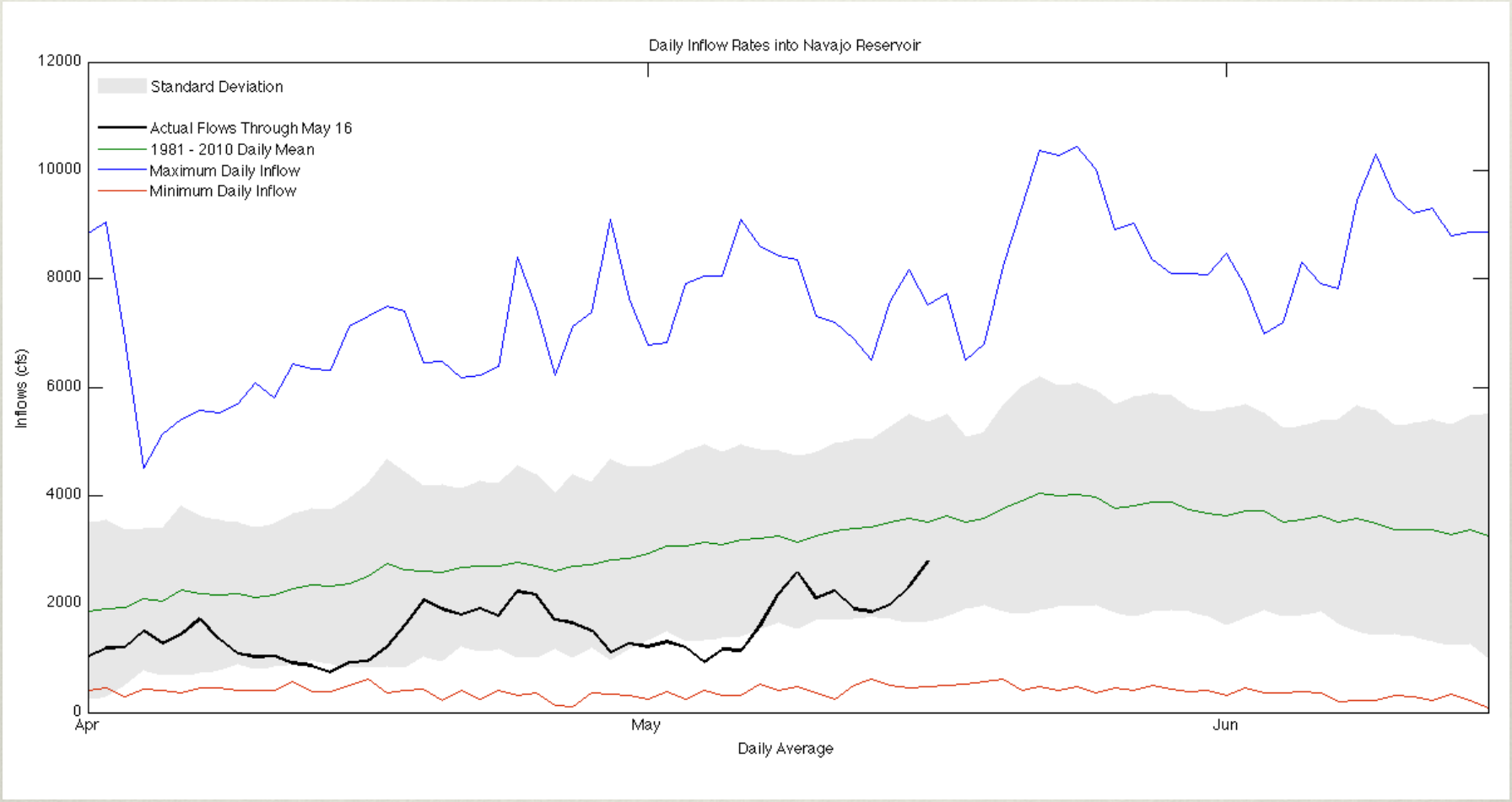
Flaming Gorge Reservoir Inflows as of 5/16/2011



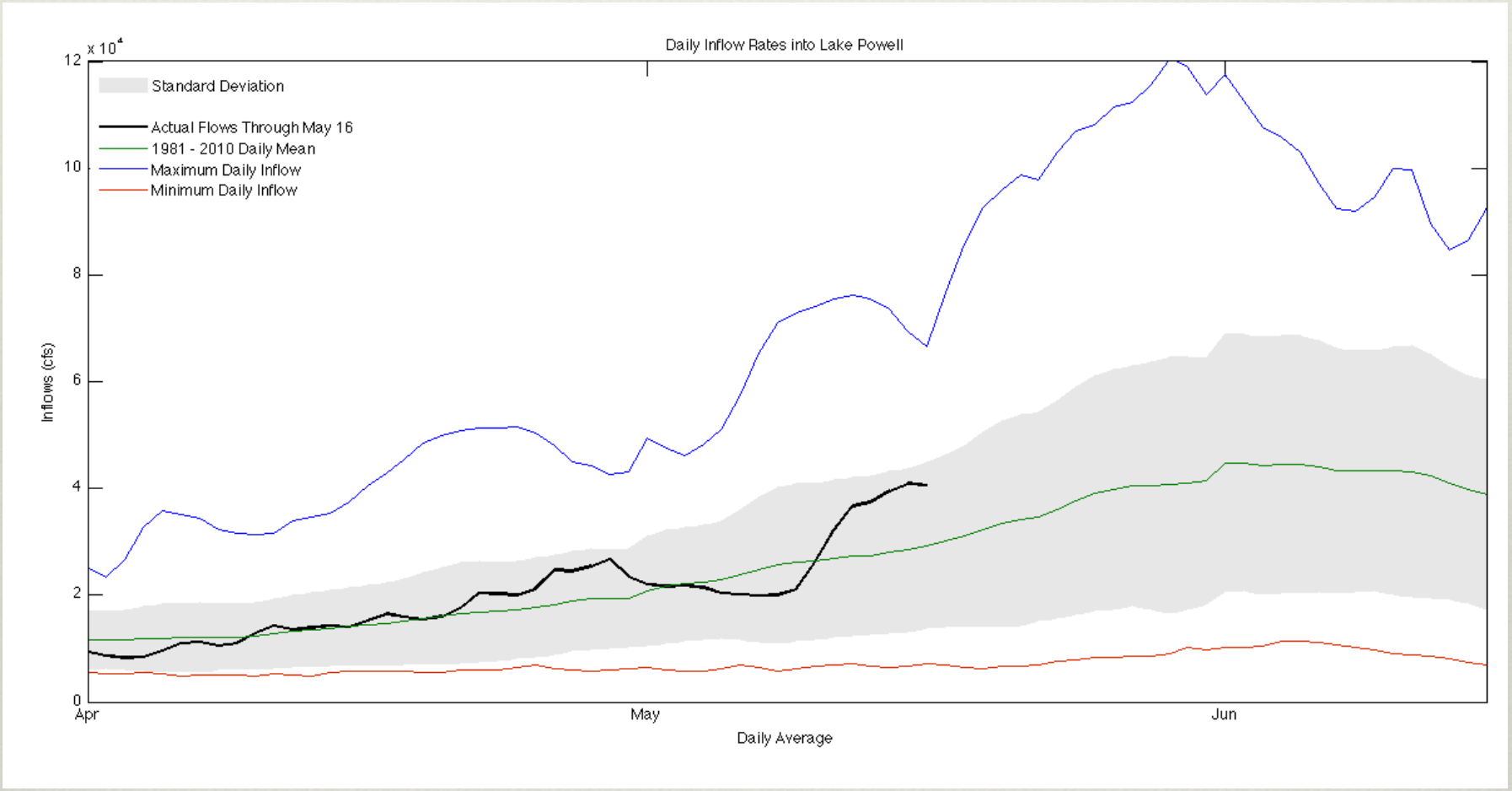
Blue Mesa Reservoir Inflows as of 5/16/2011



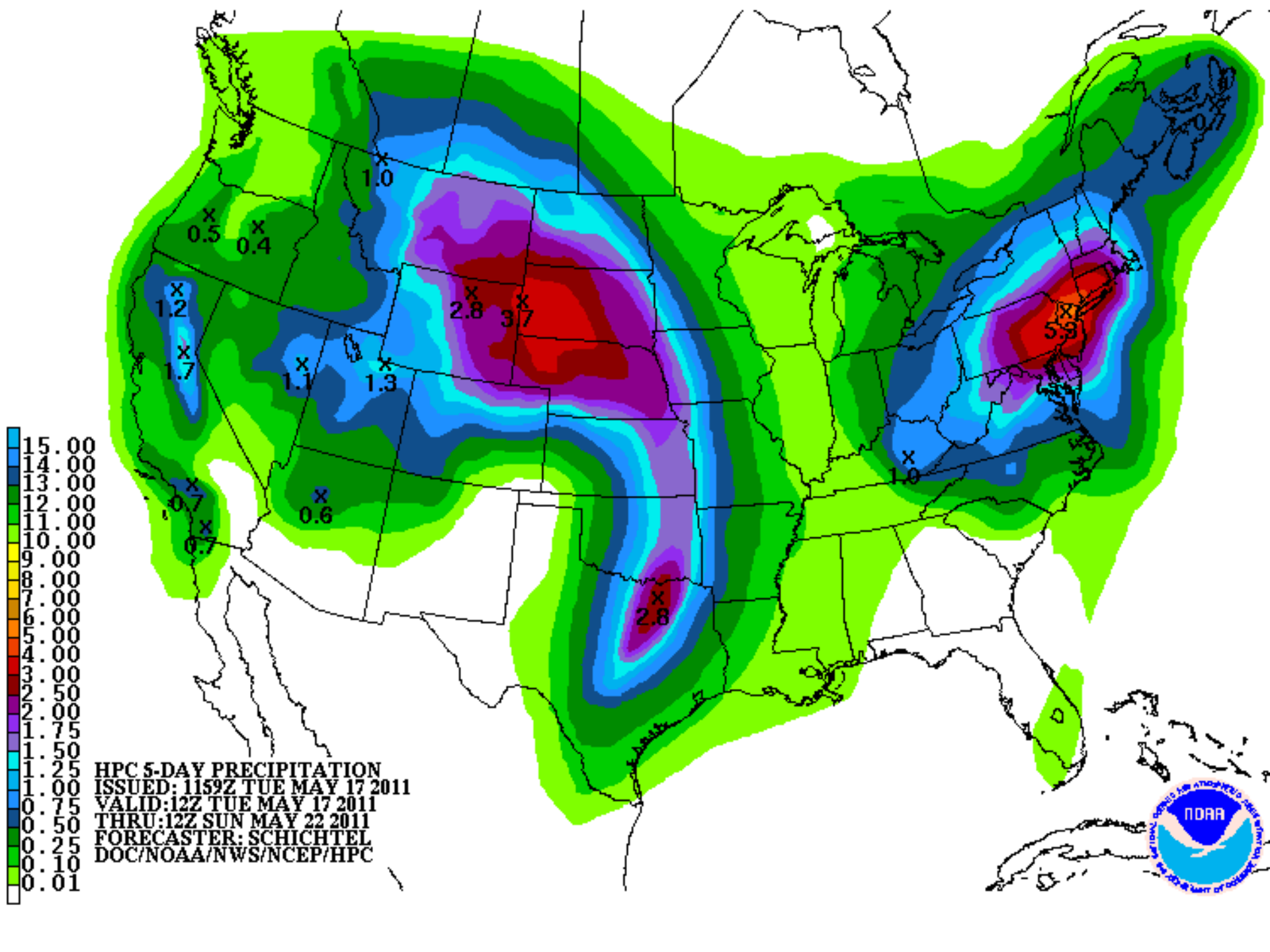
Navajo Reservoir Inflows as of 5/16/2011



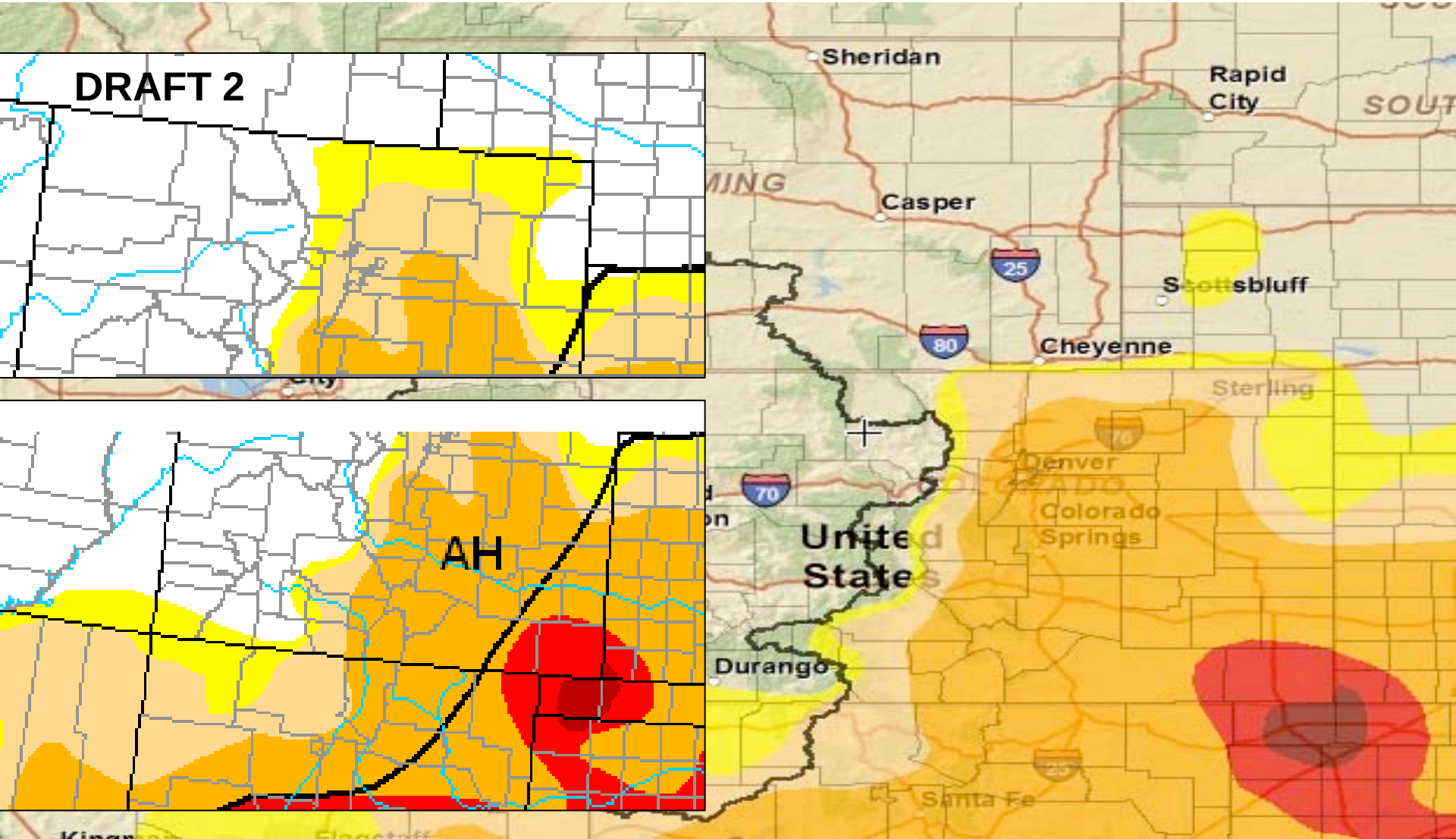
Lake Powell Inflows as of 5/16/2011



Precipitation Forecast


15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.50
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.10
0.01
HPC 5-DAY PRECIPITATION
ISSUED: 1159Z TUE MAY 17 2011
VALID:12Z TUE MAY 17 2011
THRU:12Z SUN MAY 22 2011
FORECASTER: SCHICHTEL
DOC/NOAA/NWS/NCEP/HPC
1.0
0.5
0.4
1.2
1.7
2.8
3.7
1.1
1.3
5.9
1.0
0.7
0.6
0.7
2.8
NOAA

Recommendations



INFO

For more information

NIDIS Weekly Climate, Water and Drought Assessment Summary

Upper Colorado River Basin

May 17, 2011

Precipitation and Snowpack

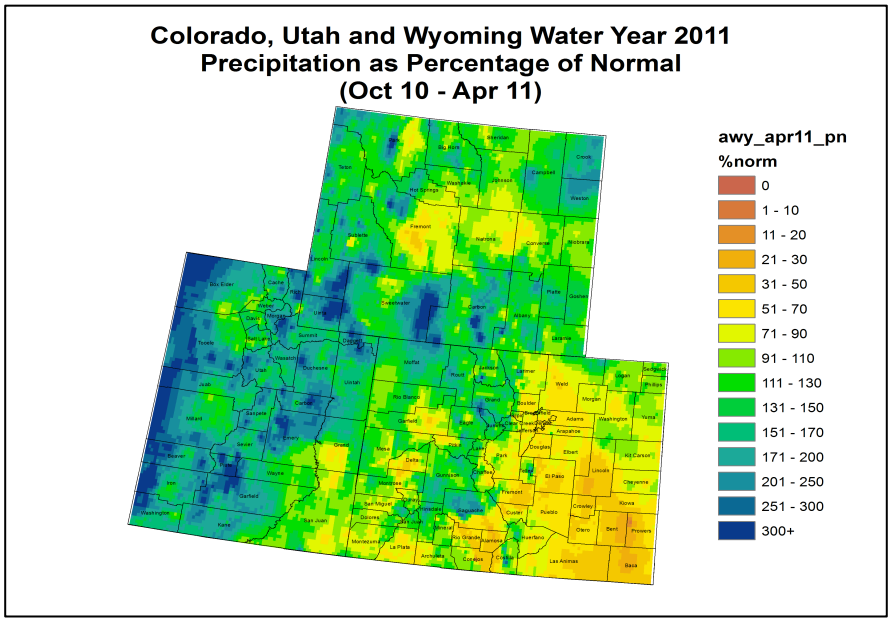


Fig. 1: October – April precipitation as a percent of average.

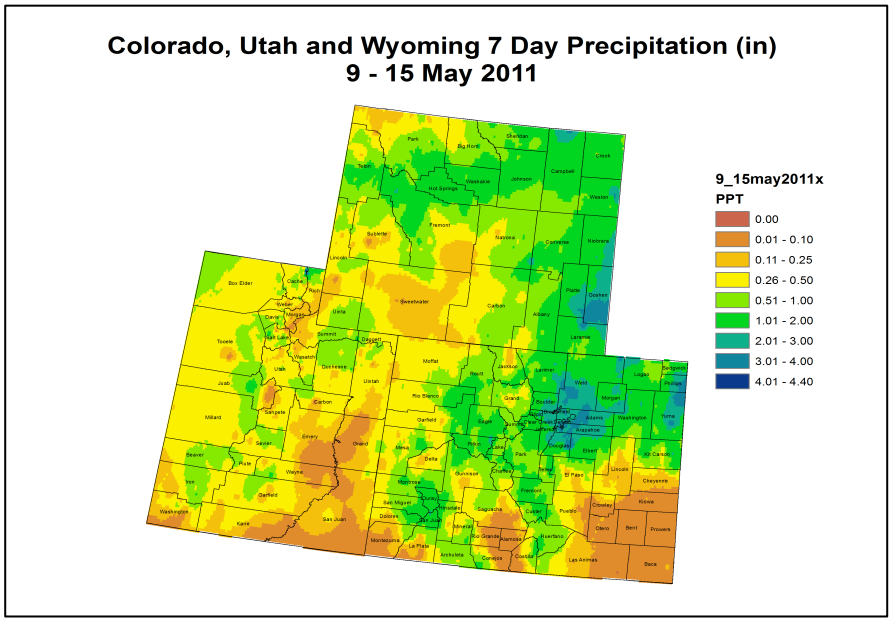


Fig. 2: May 9 – 15 precipitation in inches.

For the current water year, most of the Upper Colorado River Basin (UCRB) has received near or above average precipitation (Fig. 1). The Four Corners region and valley areas have been the driest, seeing around 50 – 90% of average precipitation. Some of the higher elevations of Utah and Wyoming were around 300% of average at the end of April. The San Luis Valley and the southeastern plains of Colorado have been very dry, receiving less than 50% of average precipitation for the water year in many areas.

Last week, the heaviest precipitation fell east of the UCRB (Fig. 2). Most of the northern portion of the UCRB received around a quarter to half an inch of moisture. The heaviest precipitation of the week focused over the South Platte basin which received around half an inch to over 2 inches of moisture. The western portion of the Arkansas basin also received beneficial moisture (between half an inch to an inch) while the rest of that basin remained fairly dry. The Four Corners area and the San Luis Valley also received very little moisture last week.

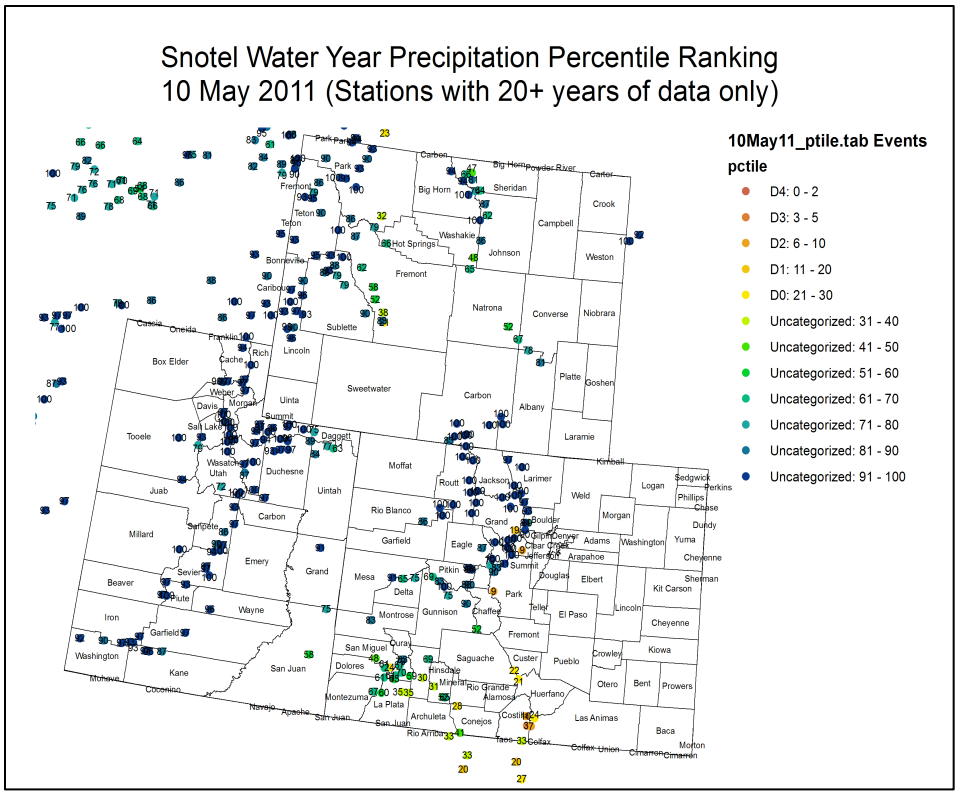


Fig. 3: SNOTEL WYTD precipitation percentiles (50% is median, 21-30% is Drought Monitor's D0 category).

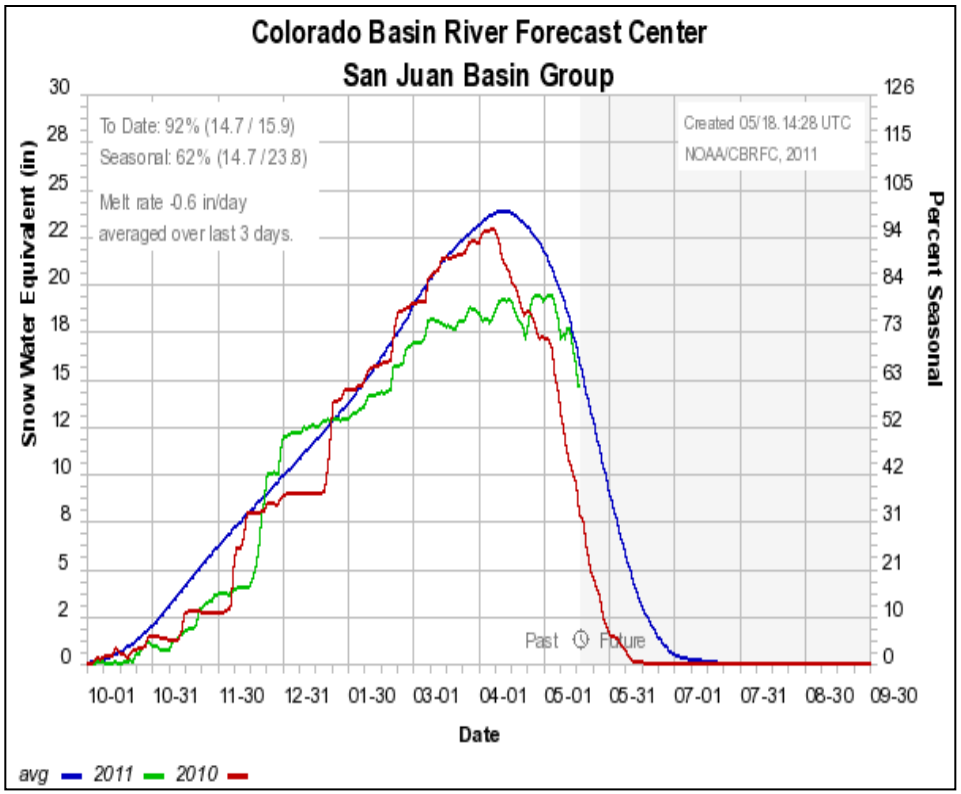


Fig. 4: San Juan Basin averaged accumulation of snow water equivalent, WYTD.

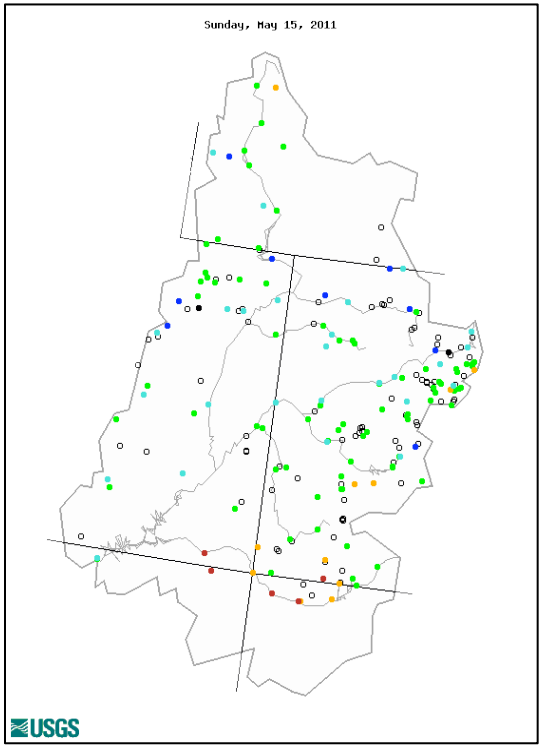
The majority of the SNOTEL sites in the UCRB are showing high percentile rankings for water-year-to-date (WYTD) precipitation (Fig. 3). The Rio Grande and San Juan basins in southern CO are the driest, showing percentile rankings below 50%. Many of the sites in the Upper Rio Grande basin are showing percentiles below 30% (meaning that 70% of the years have been wetter).

Snowpack around most of the UCRB is much above average—snowpack for the entire basin above Lake Powell was 160% of average as of May 2nd. The Upper Green basin, the Upper Colorado above Kremmling, and the Duchesne basin surpassed their seasonal peak accumulations and peaked later than average. The San Juan basin remains the driest, though delayed timing of snowmelt has helped improve conditions somewhat (Fig. 4). Most sites have been melting for nearly 2 weeks.

Streamflow

As of May 15th, about 88% of the USGS streamgages in the UCRB recorded normal (25th – 75th percentile) or above normal 7-day average streamflows (Fig. 5). With the warming temperatures and above average snowpack for the season, many sites could approach flood stage, especially in the Yampa basin. Current discharge throughout the UCRB is being forced by temperatures—runoff decreases with cooler temperatures and rapidly increases when conditions warm.

Key gages on the Colorado River near the CO-UT state line and the Green River at Green River, UT are both currently recording above normal discharge at the 75th and 82nd percentiles, respectively, while the San Juan River near Bluff, UT is currently recording much below normal flows at the 7th percentile (Fig. 6). The low flows along the San Juan could be artificial based on the controlled releases from Navajo Reservoir.



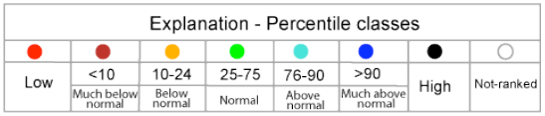


Fig. 5: USGS 7-day average streamflow compared to historical streamflow for May 15th in the UCRB.

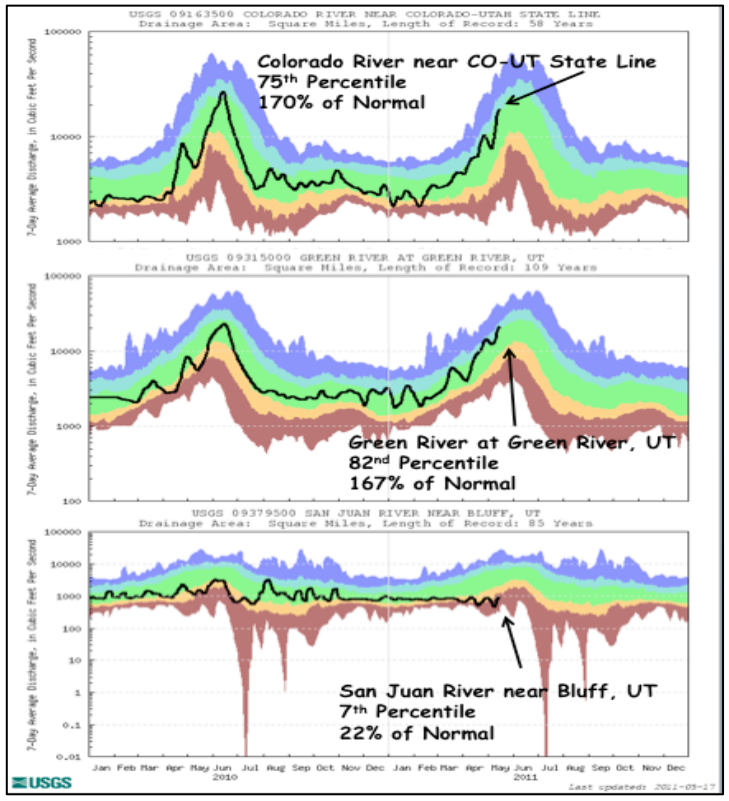


Fig. 6: USGS 7-day average discharge over time at the CO-UT stateline (top), Green River, UT (middle) and Bluff, UT (bottom).

Water Supply and Demand

Last week, the UCRB saw slightly below average temperatures (-2 to -4°F) while the northern Front Range experienced much colder temperatures (8 to 10°F below average). Soil moisture conditions remain poor for southeastern CO and the Upper Rio Grande basin in southern CO (Fig. 7). Soil moisture conditions are near average for much of the UCRB and have improved over northeastern CO. At Avondale, CO (in the Arkansas basin in southeastern CO) evapotranspiration is currently tracking along with the year of highest recorded ET, which was during the drought of 2002. This could mean that water demand will be very high this summer.

Due to delayed snowmelt in the higher elevations, most of the reservoir levels in the UCRB are below their average May levels. Storage volumes at Green Mountain, Lake Granby, and Lake Dillon continue to decrease in preparation for the large inflow volumes that have only recently begun. Lake Powell, McPhee, and Navajo Reservoir storages (all in the southern portion of the basin) have all been increasing since early April.

Precipitation Forecast

A closed low moving over the great basin will slowly move into the UCRB and bring more moisture through the beginning of the weekend. Greatest chances and amounts for precipitation will be focused on the northern portion of the basin and the northern plains, though the San Juan basin could also receive some beneficial moisture. Northeastern CO could see several inches of precipitation from this system, and additional snow accumulations are expected in the higher elevations of the UCRB. There will also be a convective element across the lower elevations with this system and the possibility of very high localized accumulations. The system will not bring much moisture to southeastern CO. A brief period of dryness will follow for the much of the weekend and into Monday, though models show another slow-moving disturbance moving into the region next Tuesday through Thursday. The region could return to drier conditions for the Memorial Day weekend, though temperatures are likely to stay cooler than average.

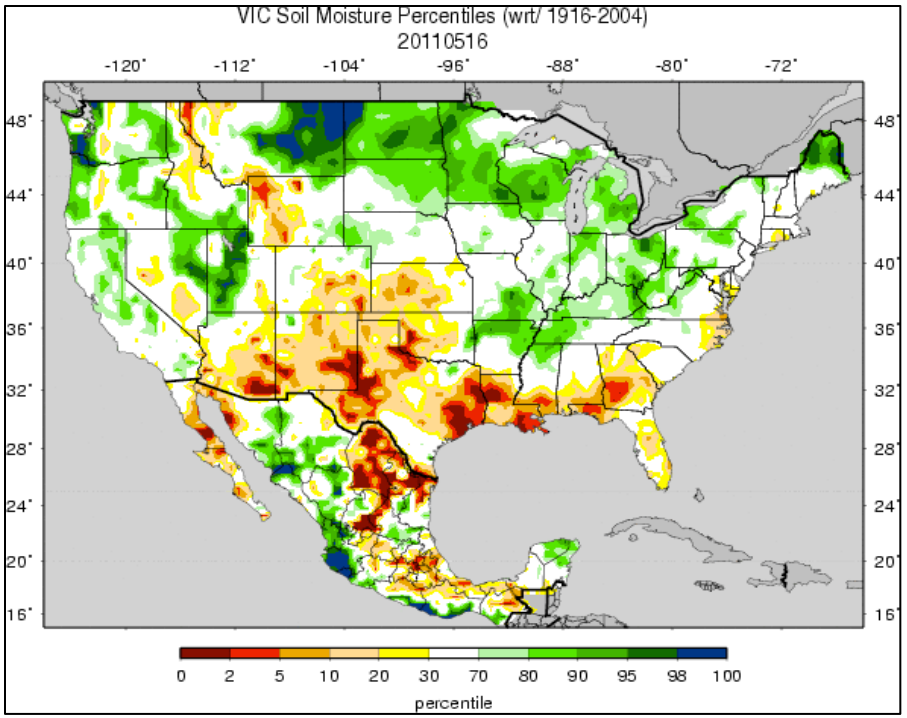


Fig. 7: VIC soil moisture percentils as of May 16th.

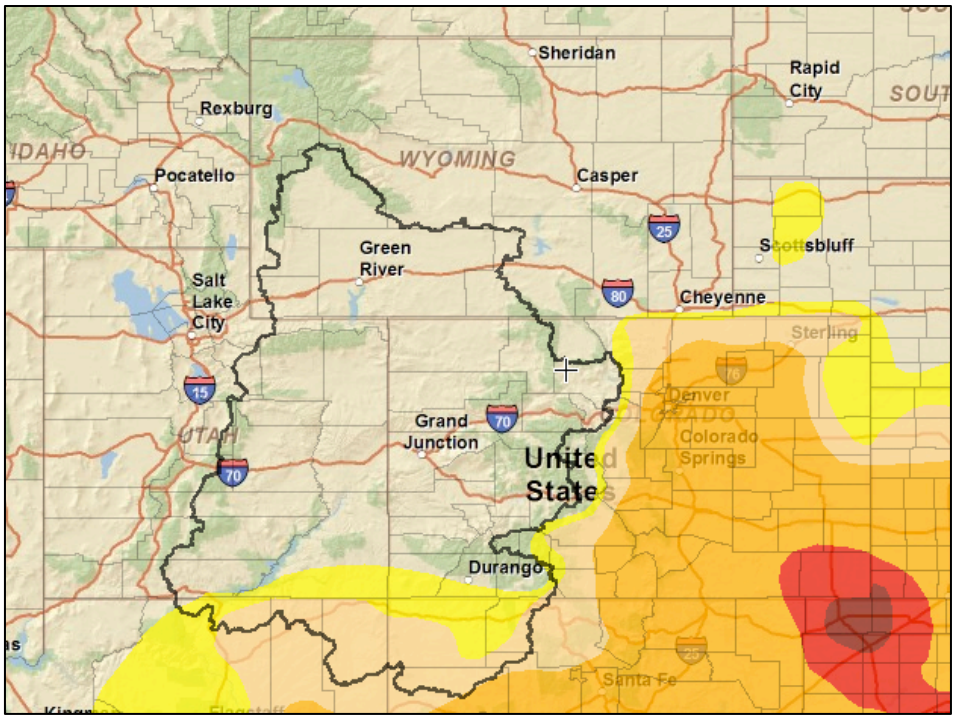


Fig. 8: May 10th release of U.S. Drought Monitor for the UCRB

Drought – Exceptional		0 to 2 (D4)
Drought – Extreme		2 to 5 (D3)
Drought – Severe		5 to 10 (D2)
Drought – Moderate		10 to 20 (D1)
Abnormally Dry		20 to 30 (D0)

Drought categories and
their associated percentiles

Drought and Water Discussion

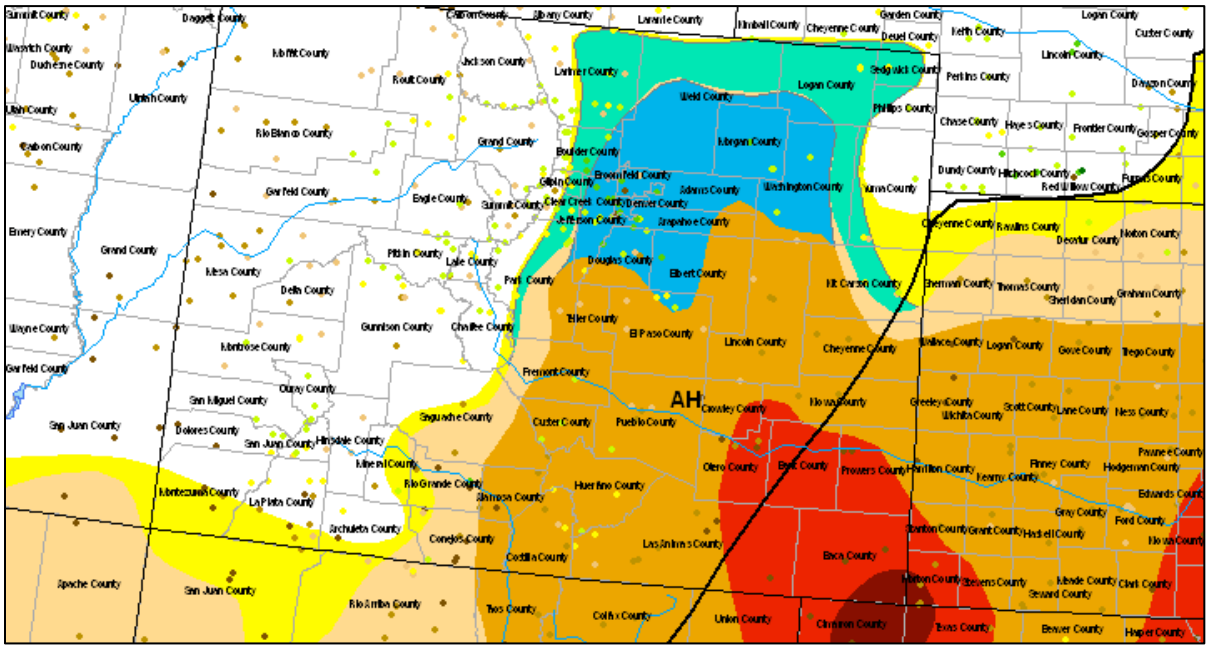


Fig. 9: Adjustments that the USDM author has made to the USDM map. Aqua is improvement from D1 to D0; blue is improvement from D2 to D1; red and maroon show expansion of D3 and D4 in southeastern CO.

Several changes are being recommended for the current U.S. Drought Monitor (USDM) map (Fig. 8). Due to the beneficial rains that fell over northeastern CO, the current USDM author has already scaled back the D0, D1, and D2 in those areas (Fig. 9).

Additional improvements were also recommended for the western portion of the Arkansas basin based on observations in Fremont County. However, conditions are still drier in eastern Park County. Therefore, based on smoothness of the lines, it is recommended to limit the improvements to what the USDM author has already done and re-evaluate these counties next week.

Standardized precipitation index values (SPIs) in southeastern CO are around -2 on all time scales (including a -3 9-month SPI in Crowley County). Based on this and reported impacts, an expansion of D3 is being recommended. The USDM author has already included this change (Fig. 9) and has also introduced D4 into extreme southeastern Baca County.