

Spring  
2012

April 24<sup>th</sup>, 2012

NIDIS - UPPER COLORADO BASIN PILOT PROJECT

Weekly Climate, Water & Drought Assessment

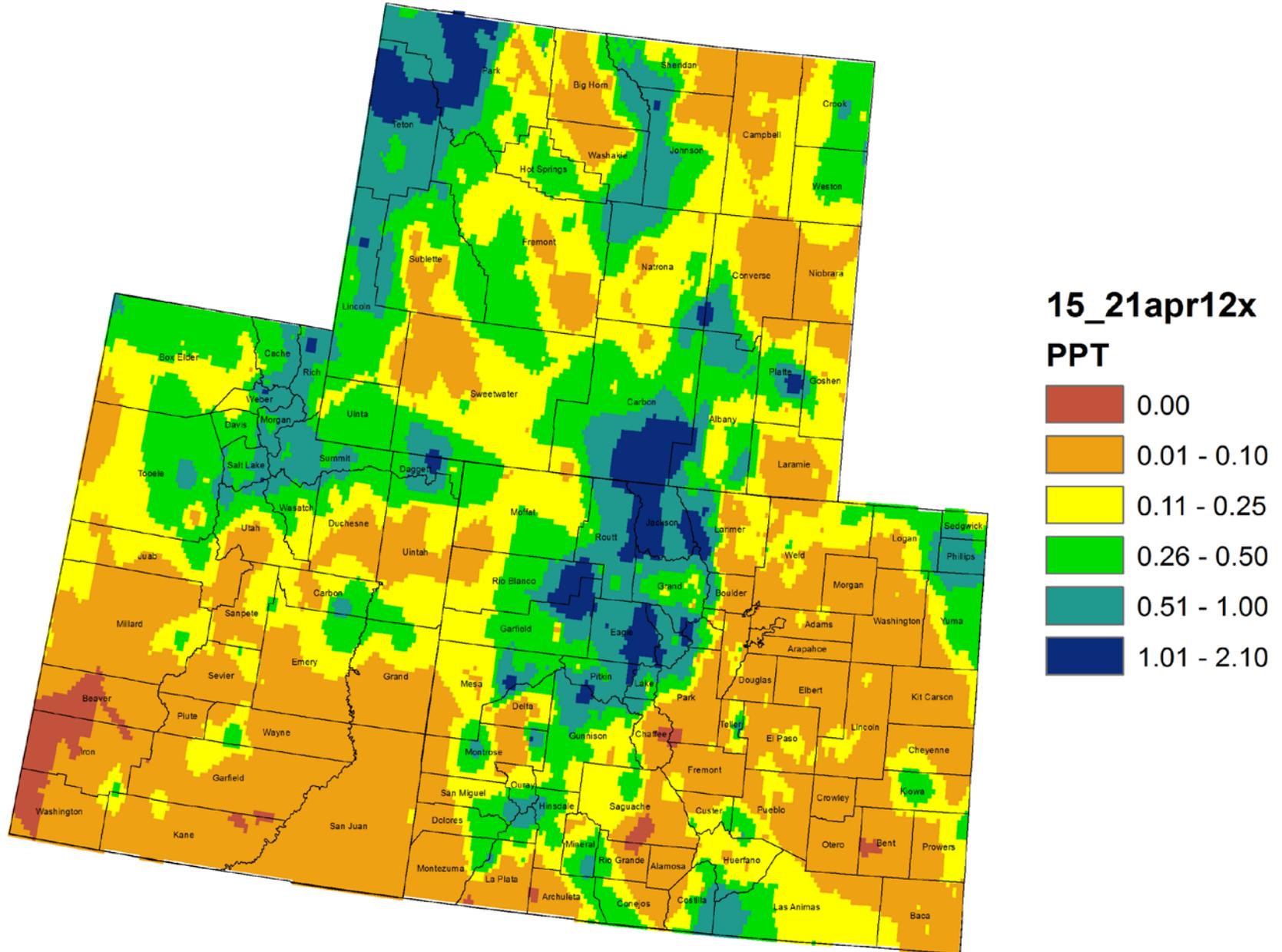
# Today's Agenda

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

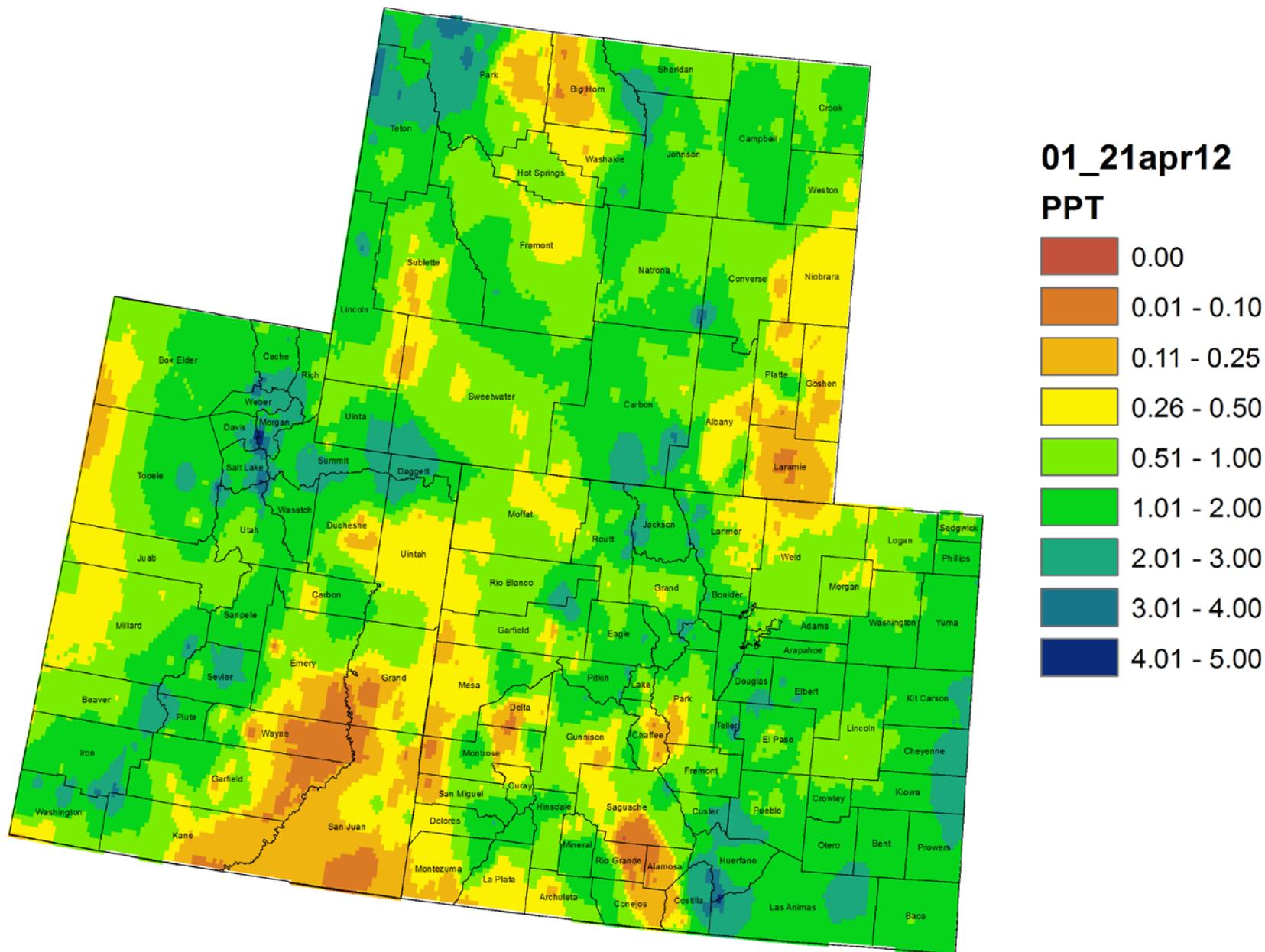
# Precipitation/Snowpack Update



# Colorado, Utah and Wyoming 7 Day Precipitation (inches) 15 - 21 April 2012

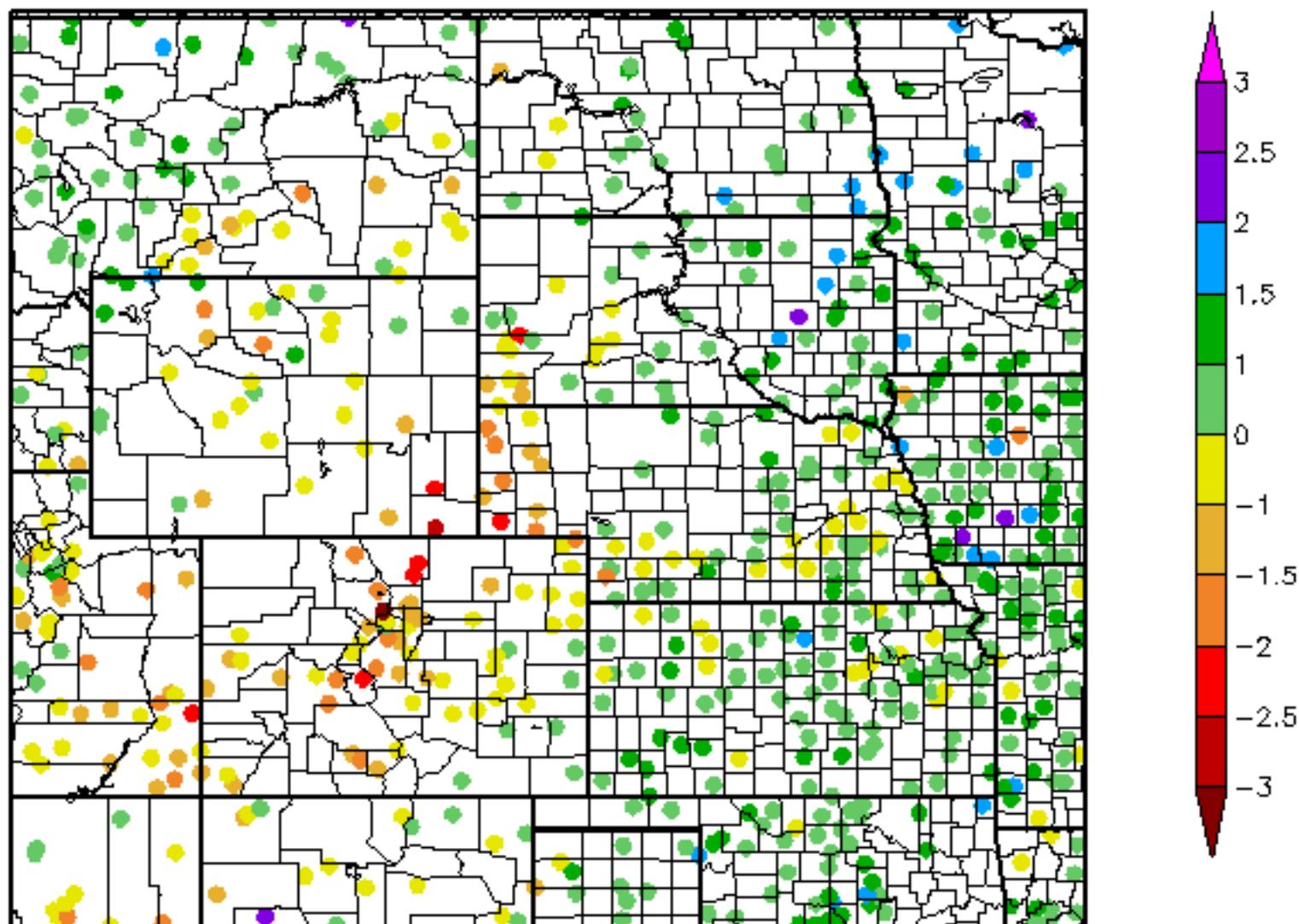


# Colorado, Utah and Wyoming Month to Date Precipitation (inches) 1 - 21 April 2012



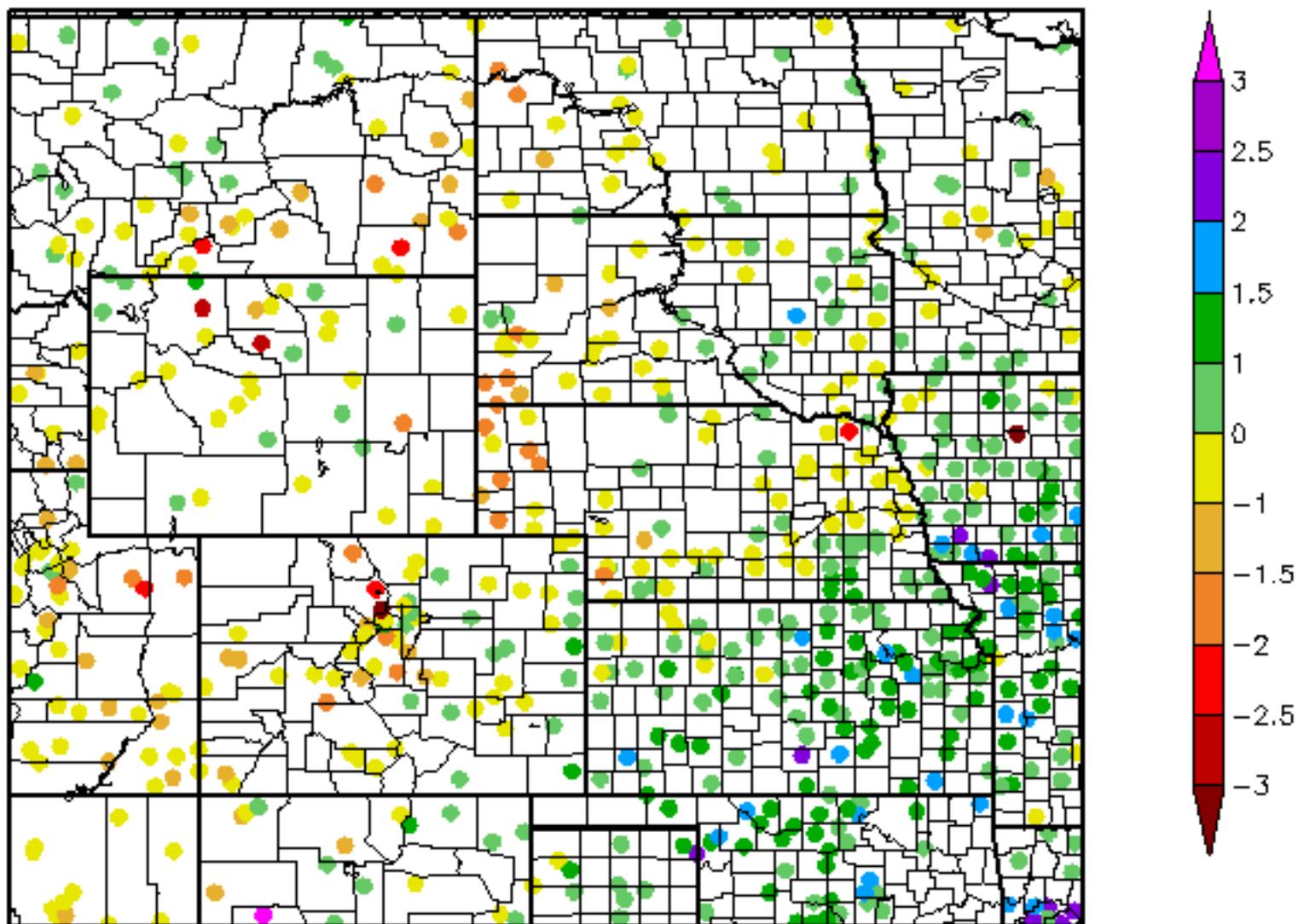
# 60 Day SPI

2/23/2012 - 4/22/2012



# 6 Month SPI

10/23/2011 - 4/22/2012

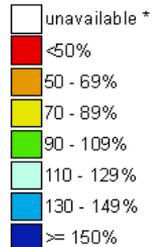




# Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

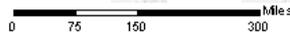
Apr 24, 2012

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1971-2000 Normal



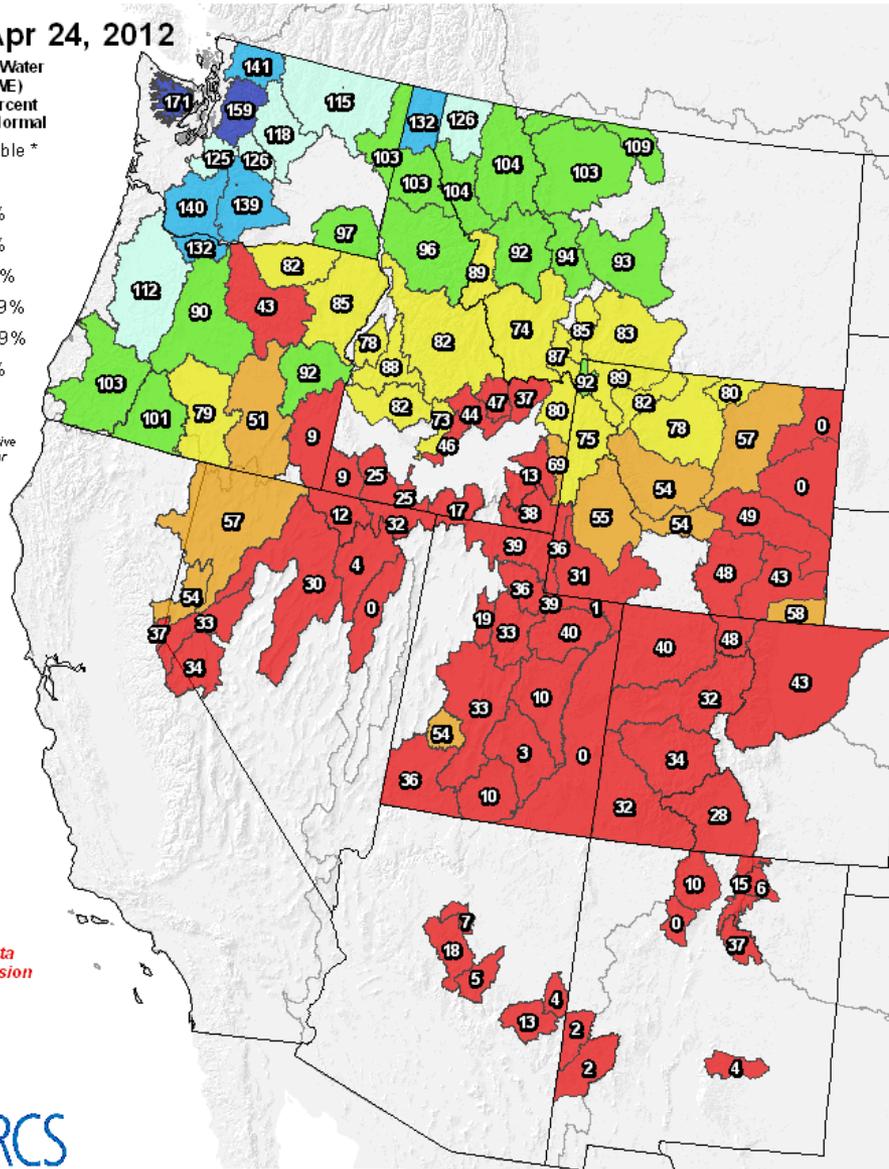
\* Data unavailable at time of posting or measurement is not representative at this time of year

Provisional data subject to revision

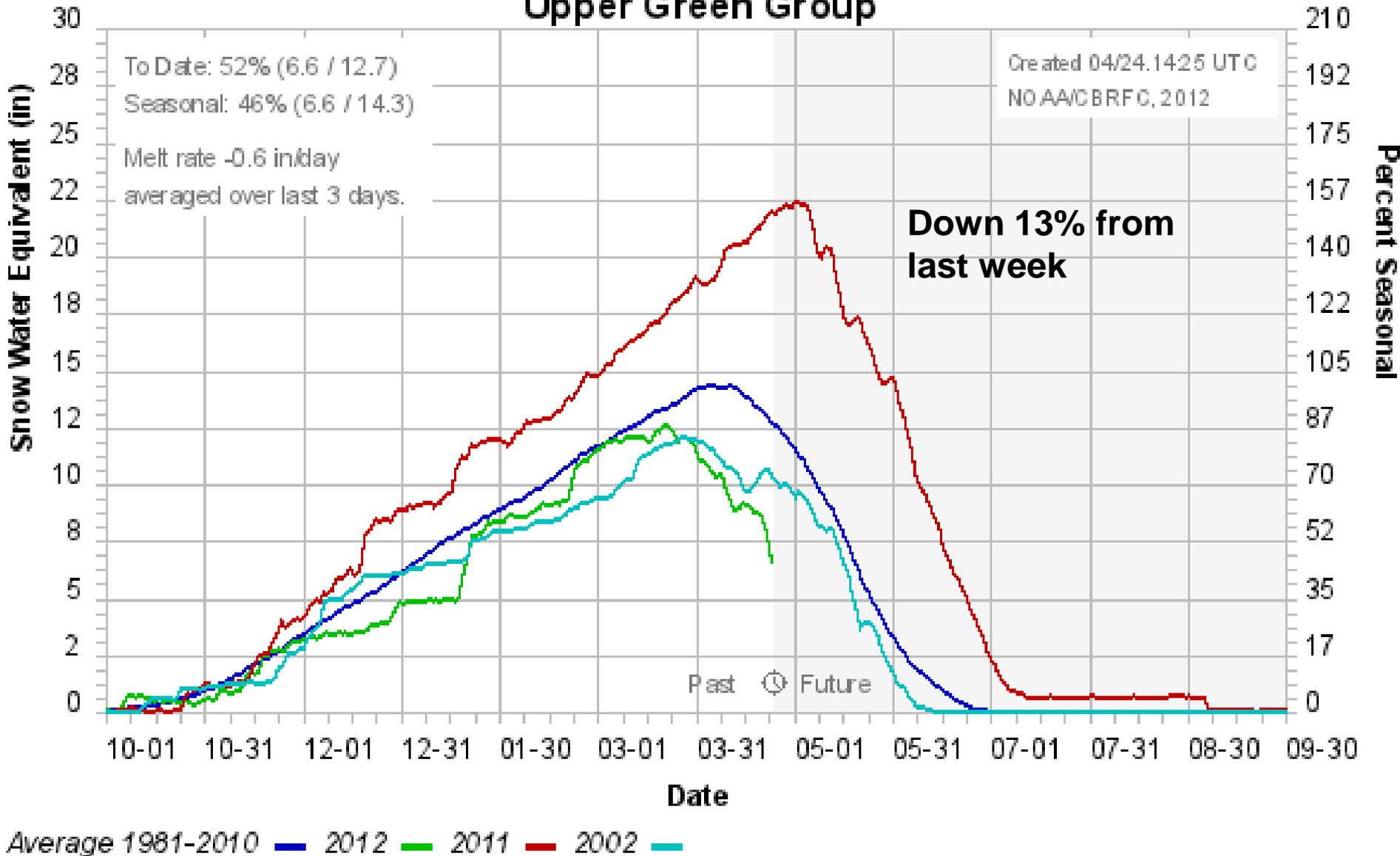


The snow water equivalent percent of normal represents the current snowwater equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

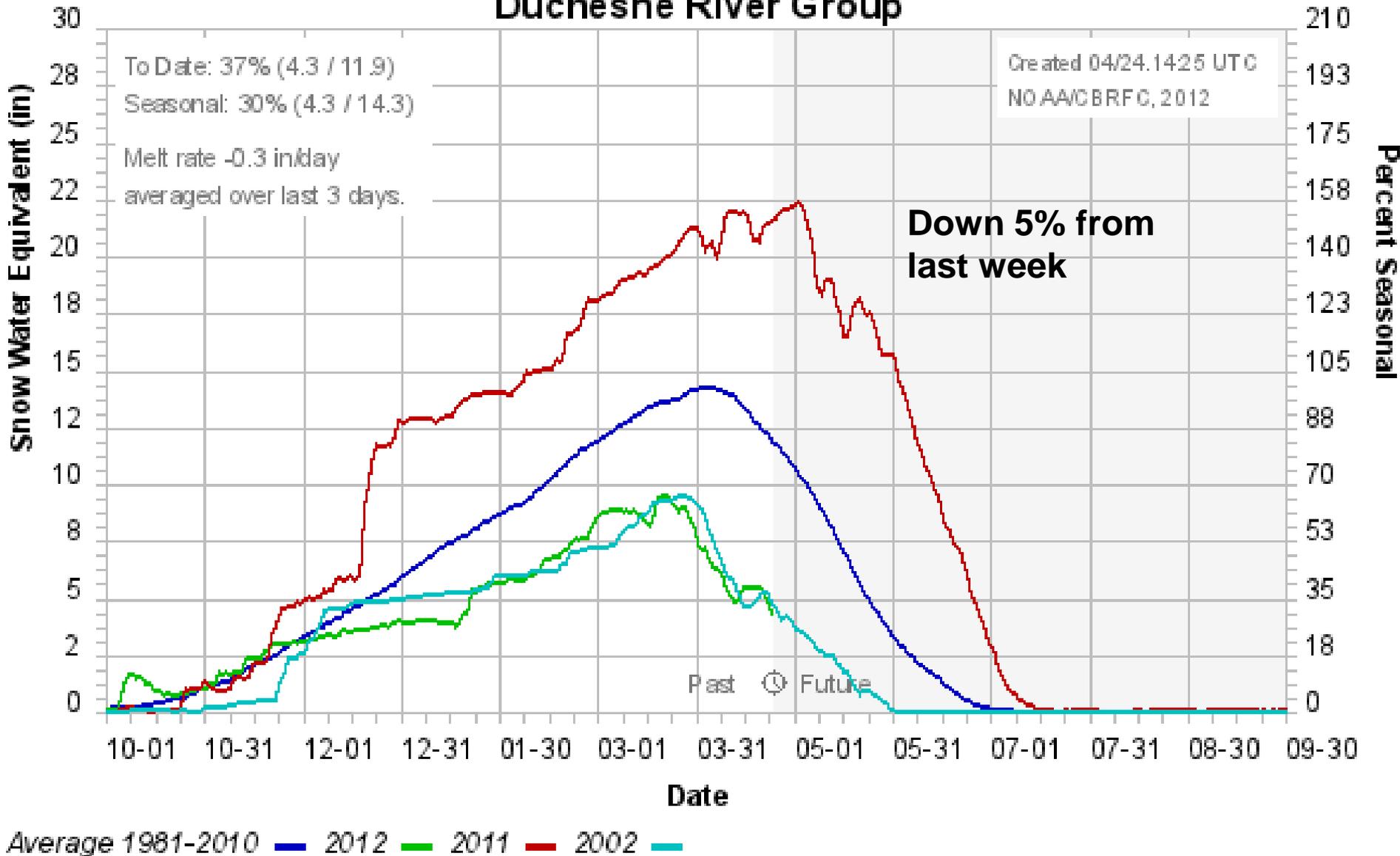
Prepared by the USDA/NRCS National Water and Climate Center  
Portland, Oregon <http://www.wcc.nrcs.usda.gov/gis/>  
Based on data from <http://www.wcc.nrcs.usda.gov/reports/>  
Science contact: Jim.Marron@por.usda.gov 503 414 3047



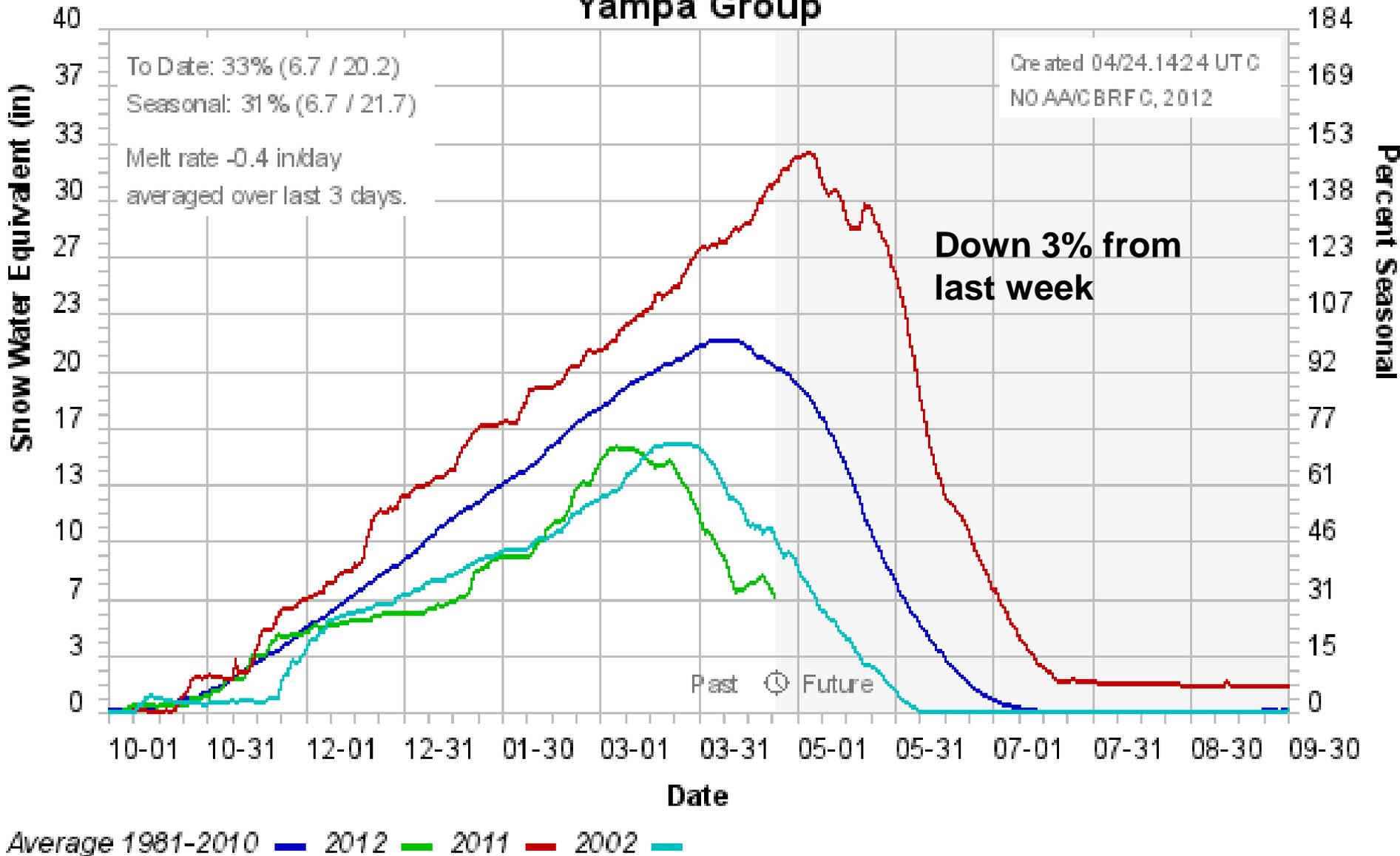
# Colorado Basin River Forecast Center Upper Green Group



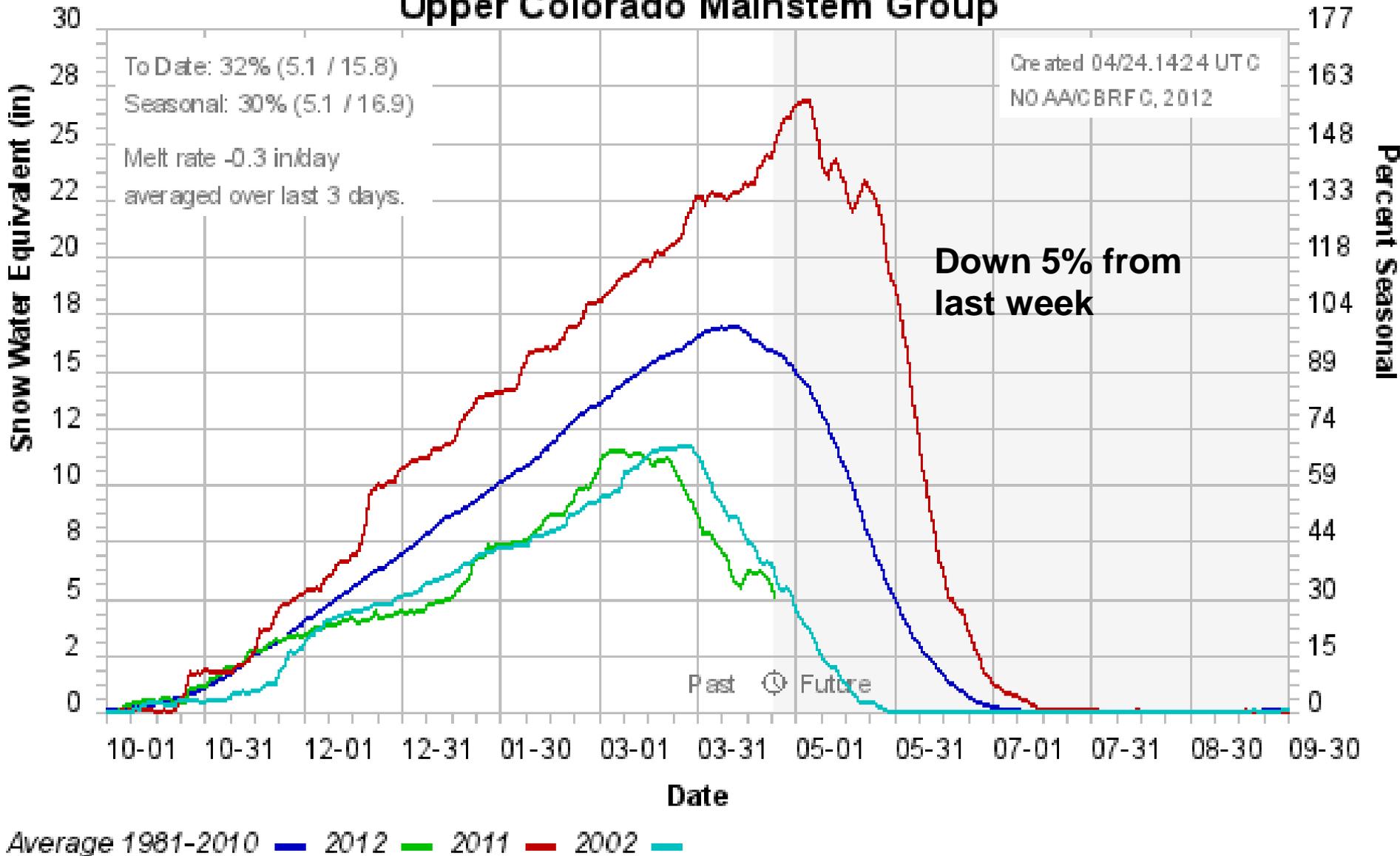
# Colorado Basin River Forecast Center Duchesne River Group



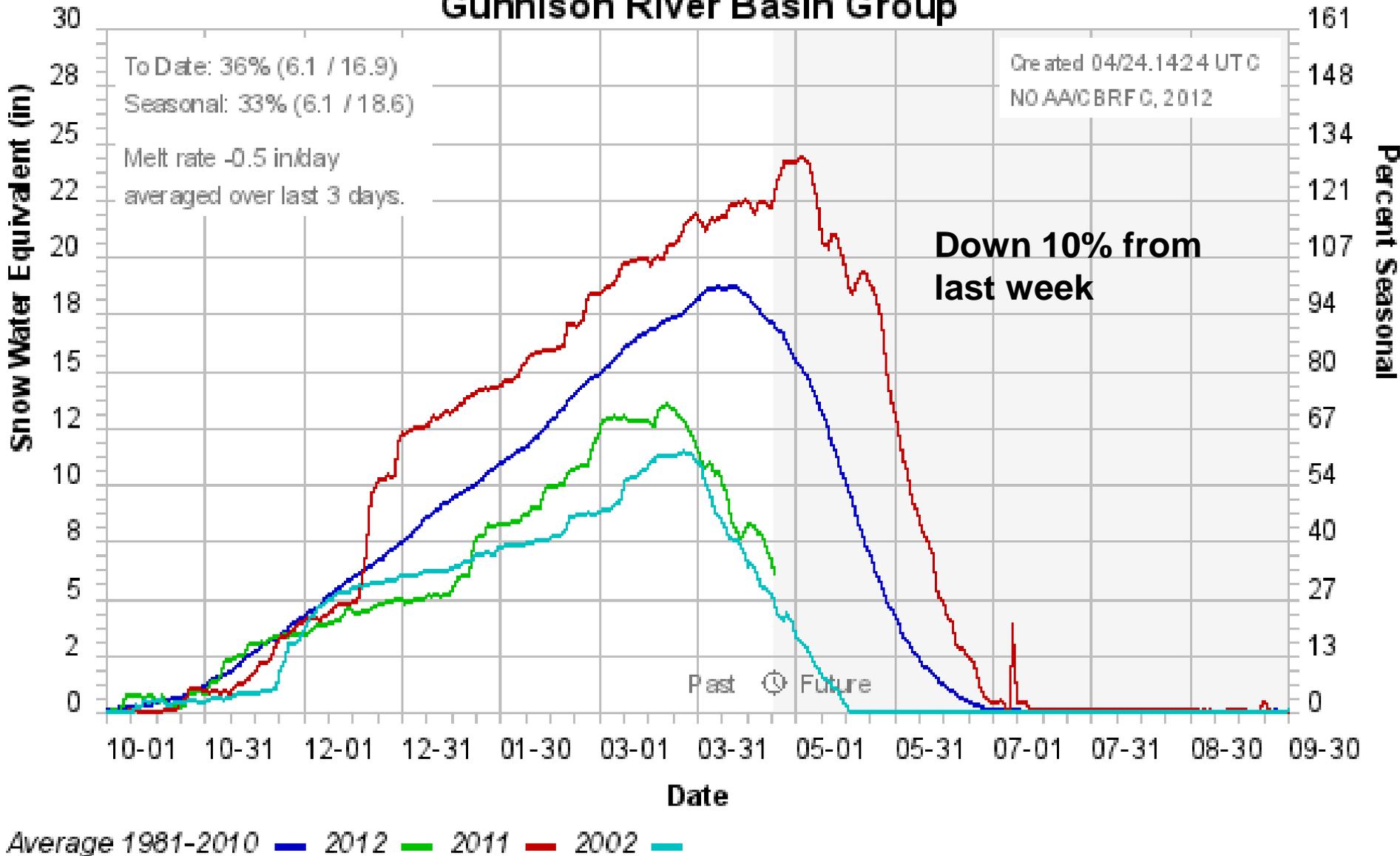
# Colorado Basin River Forecast Center Yampa Group



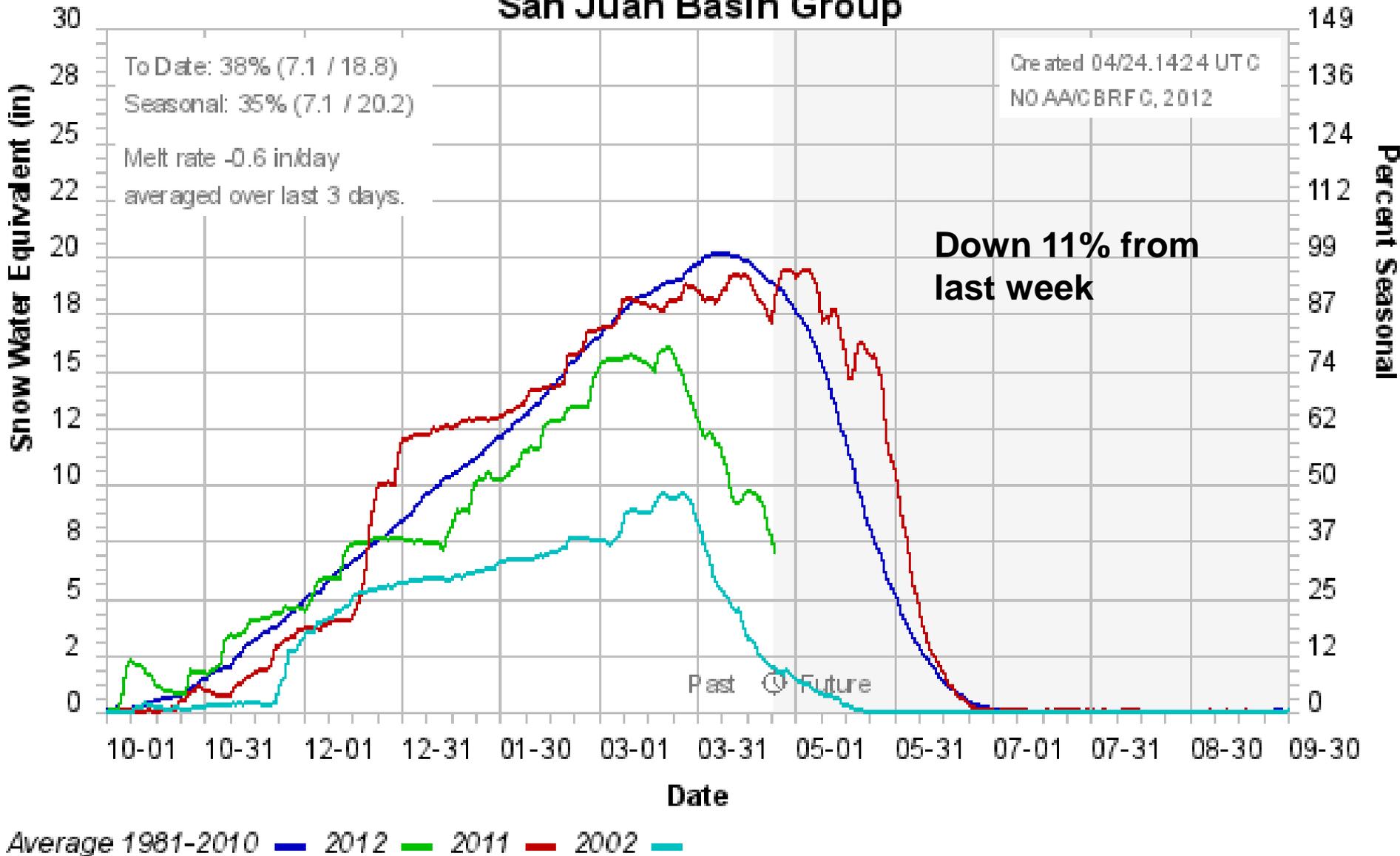
# Colorado Basin River Forecast Center Upper Colorado Mainstem Group



# Colorado Basin River Forecast Center Gunnison River Basin Group



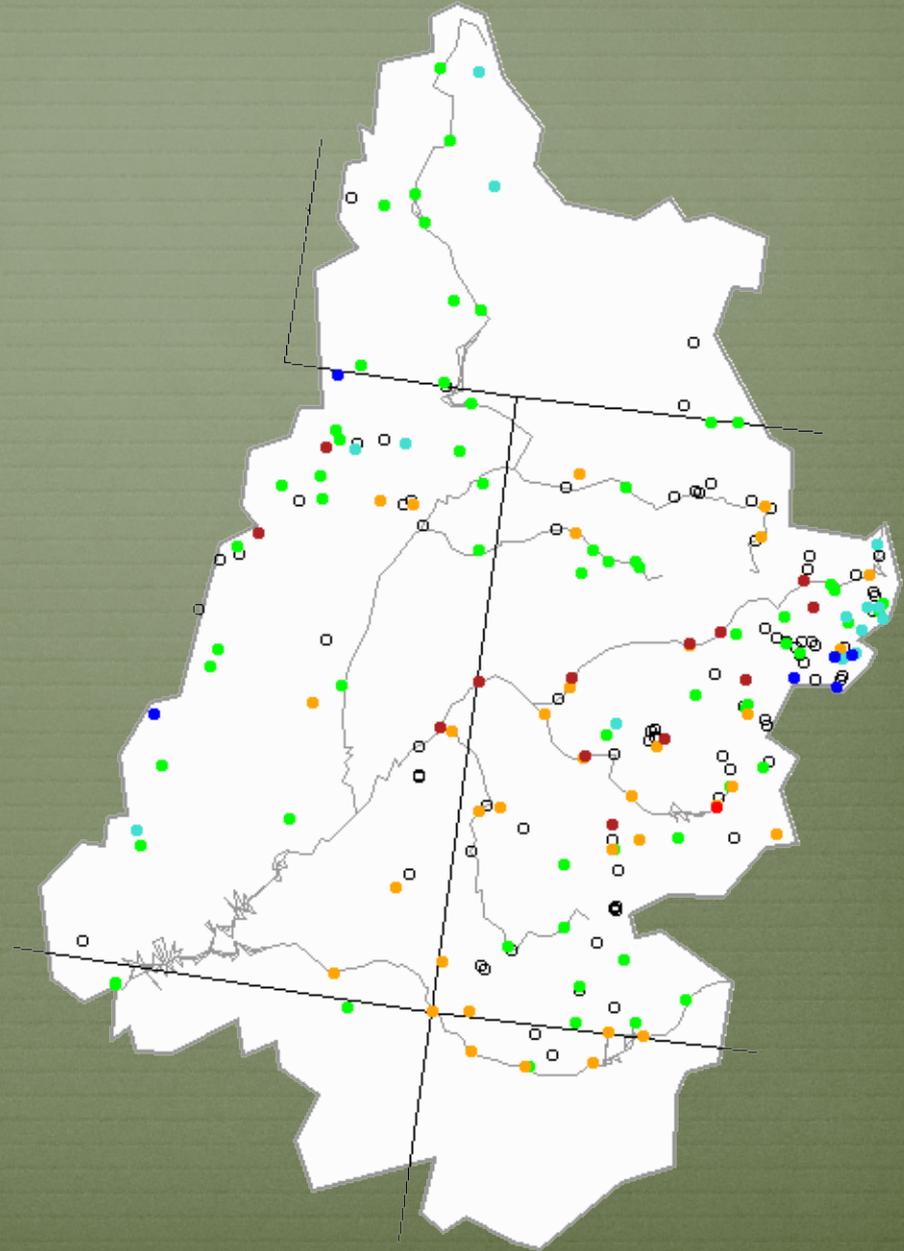
# Colorado Basin River Forecast Center San Juan Basin Group



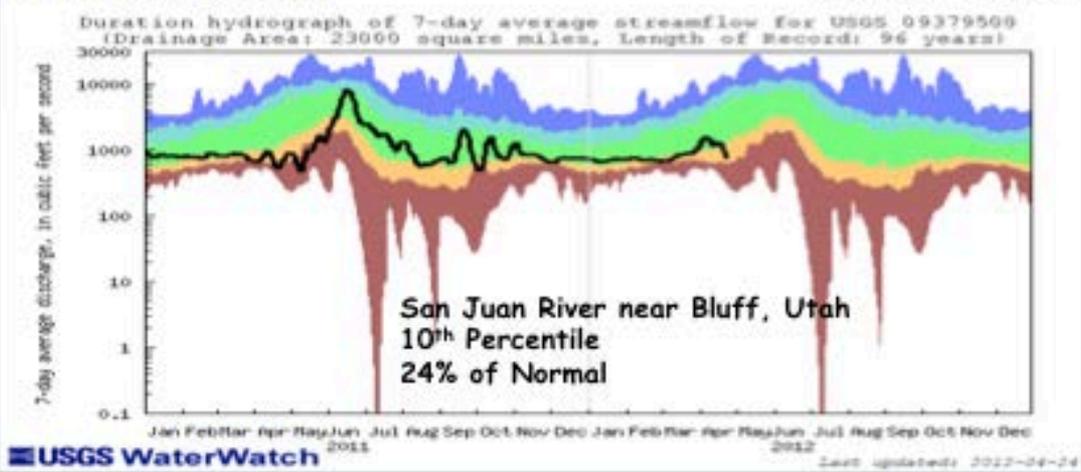
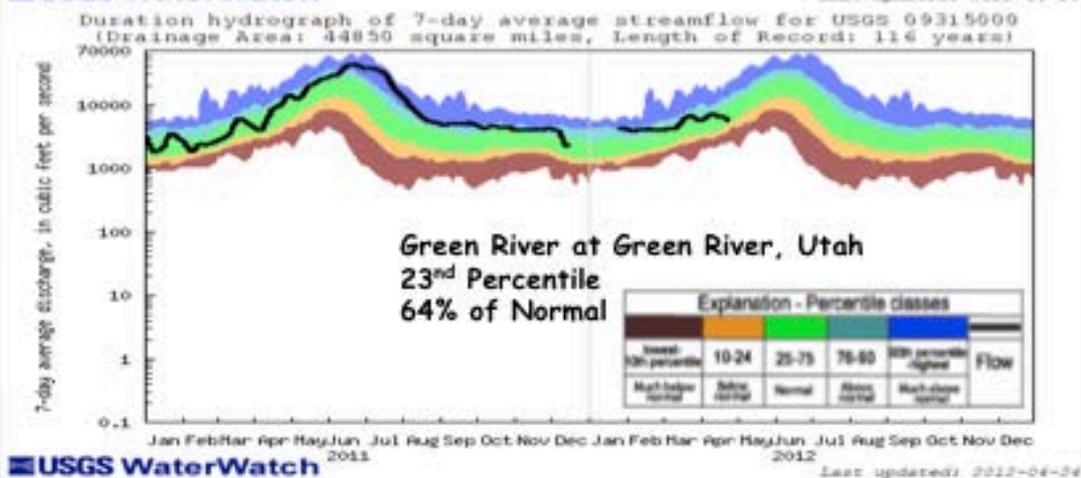
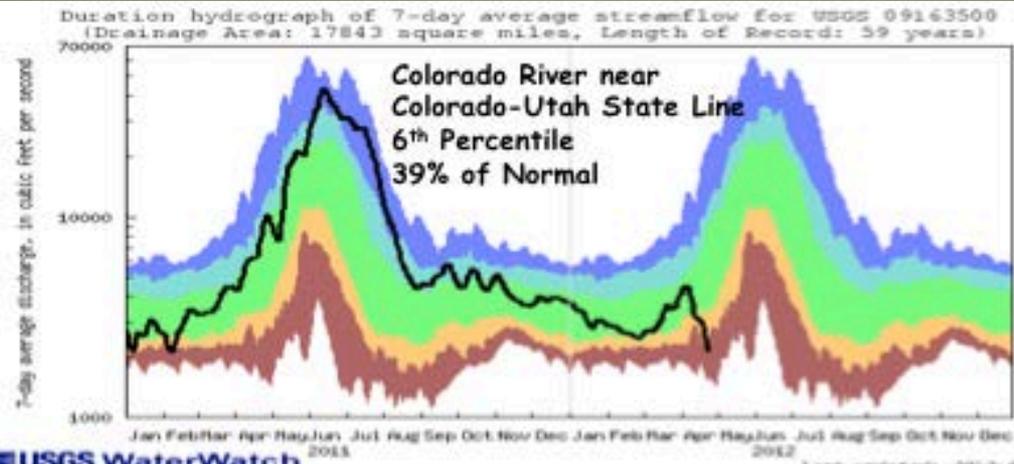
# Streamflow Update



7-day average discharge compared to historical discharge for the day of the year (April 22)

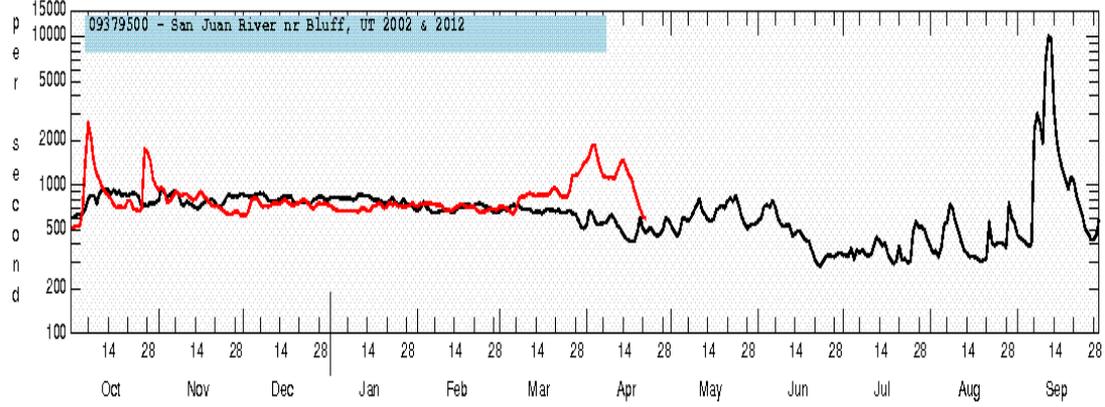
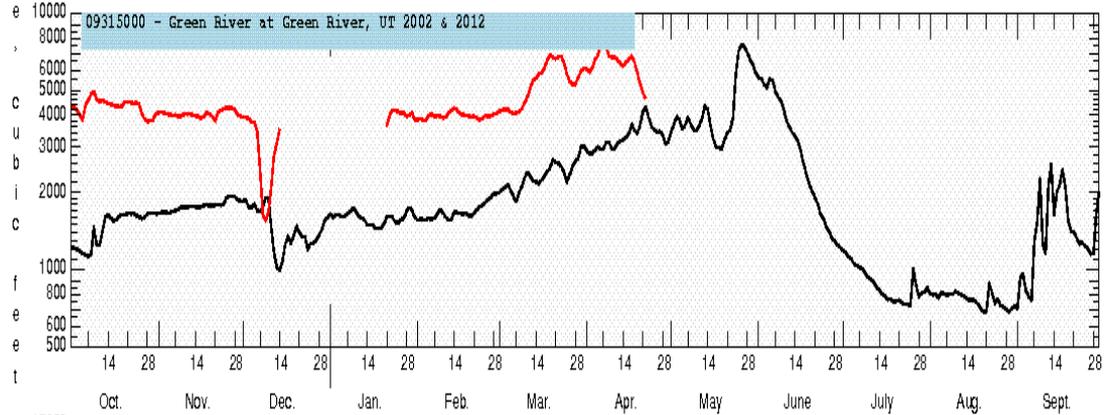
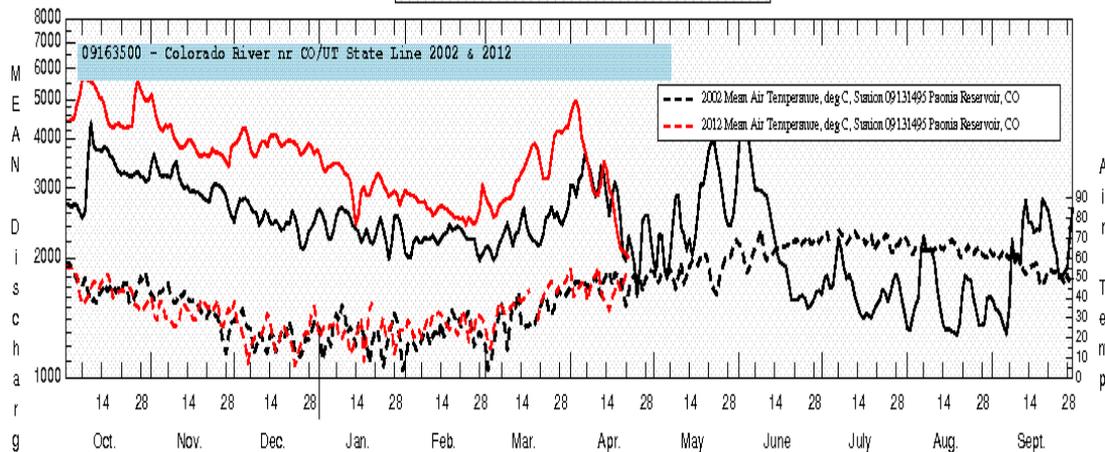


Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		



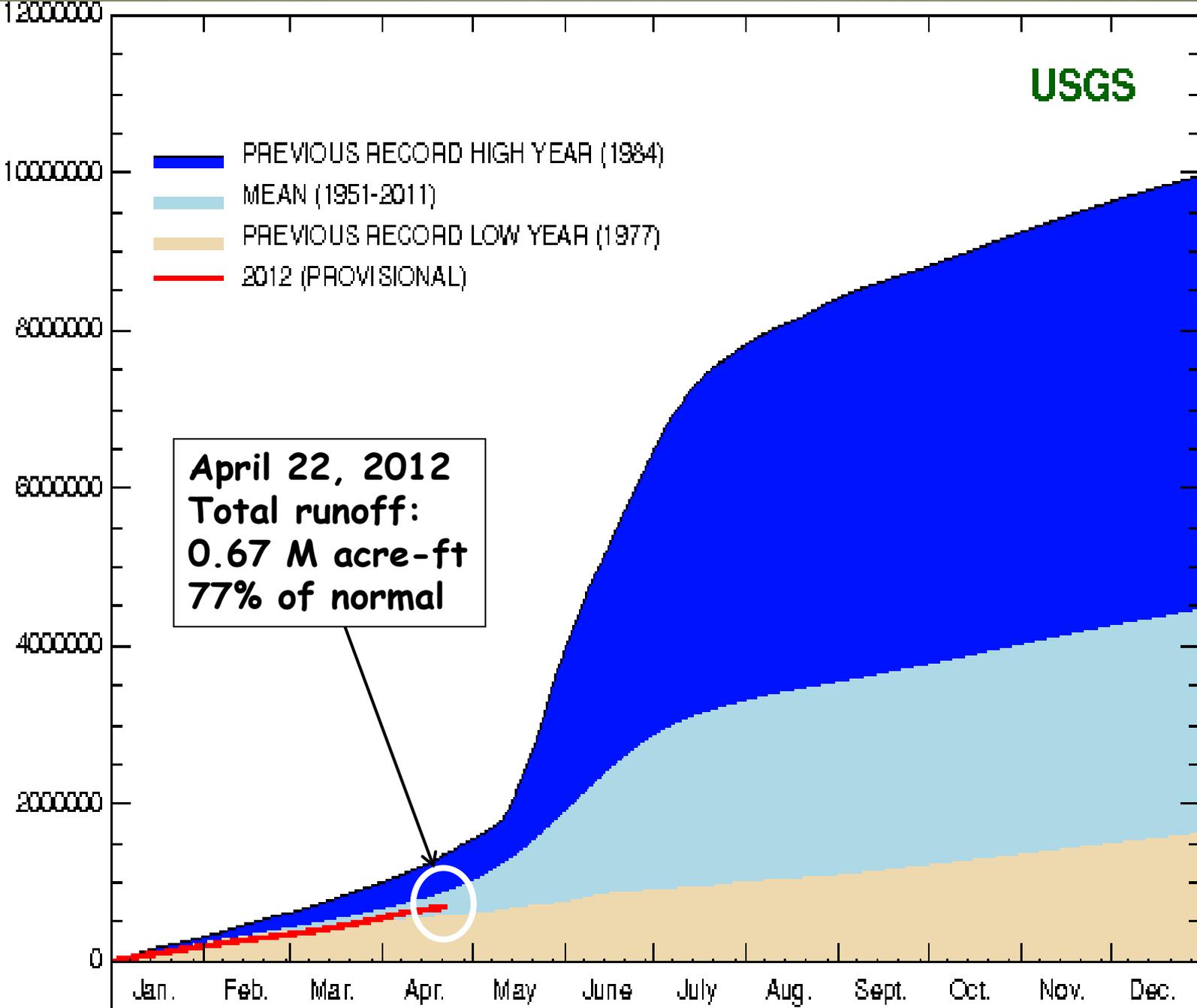
# Colorado River Basin 2002 vs. 2012 Mean Daily Discharge Comparison at Select Stations

— Water Year 2002 Mean Daily Discharge  
 — Water Year 2012 Mean Daily Discharge



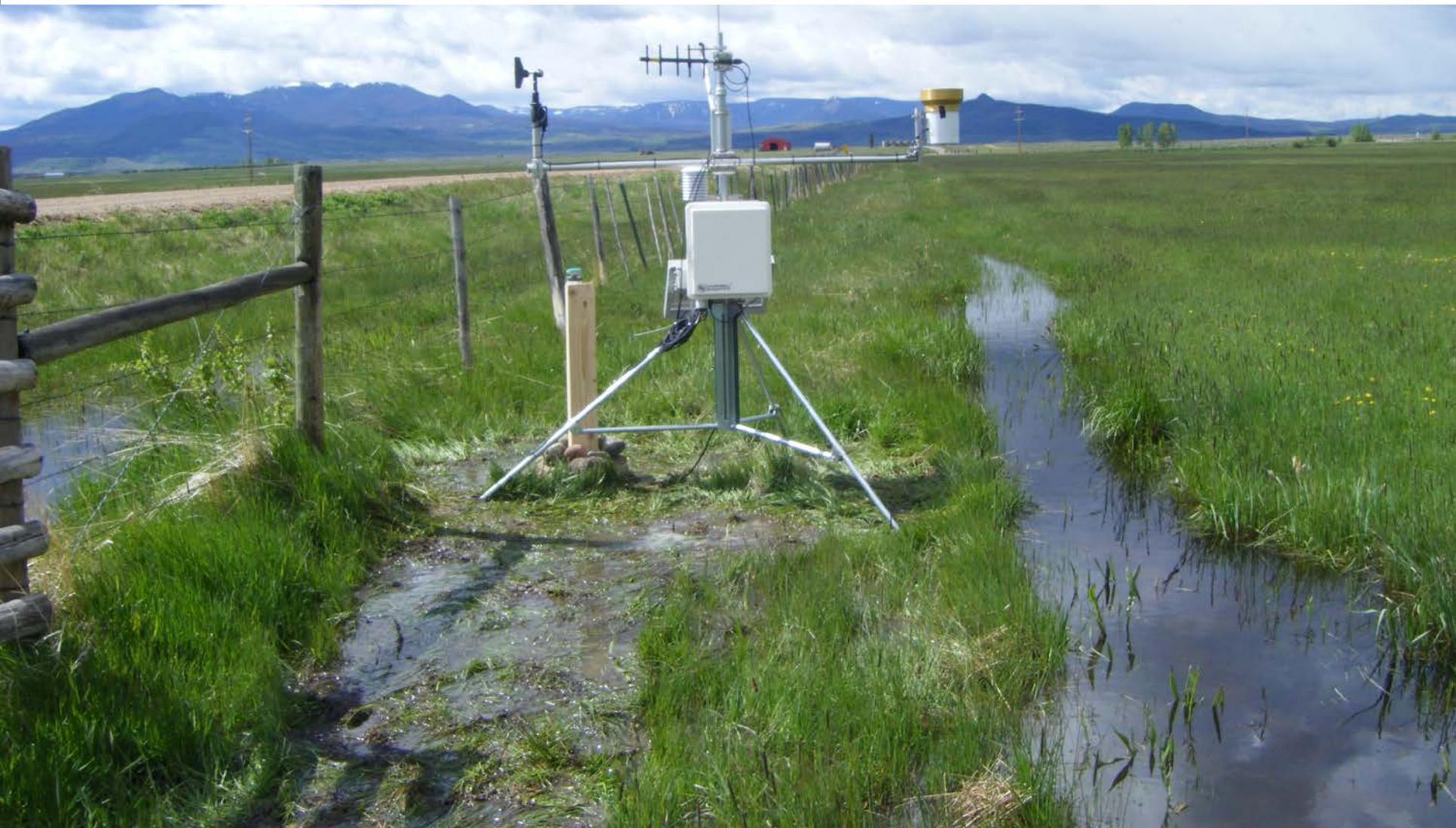
USGS

STREAM FLOW IN ACRES- FEET

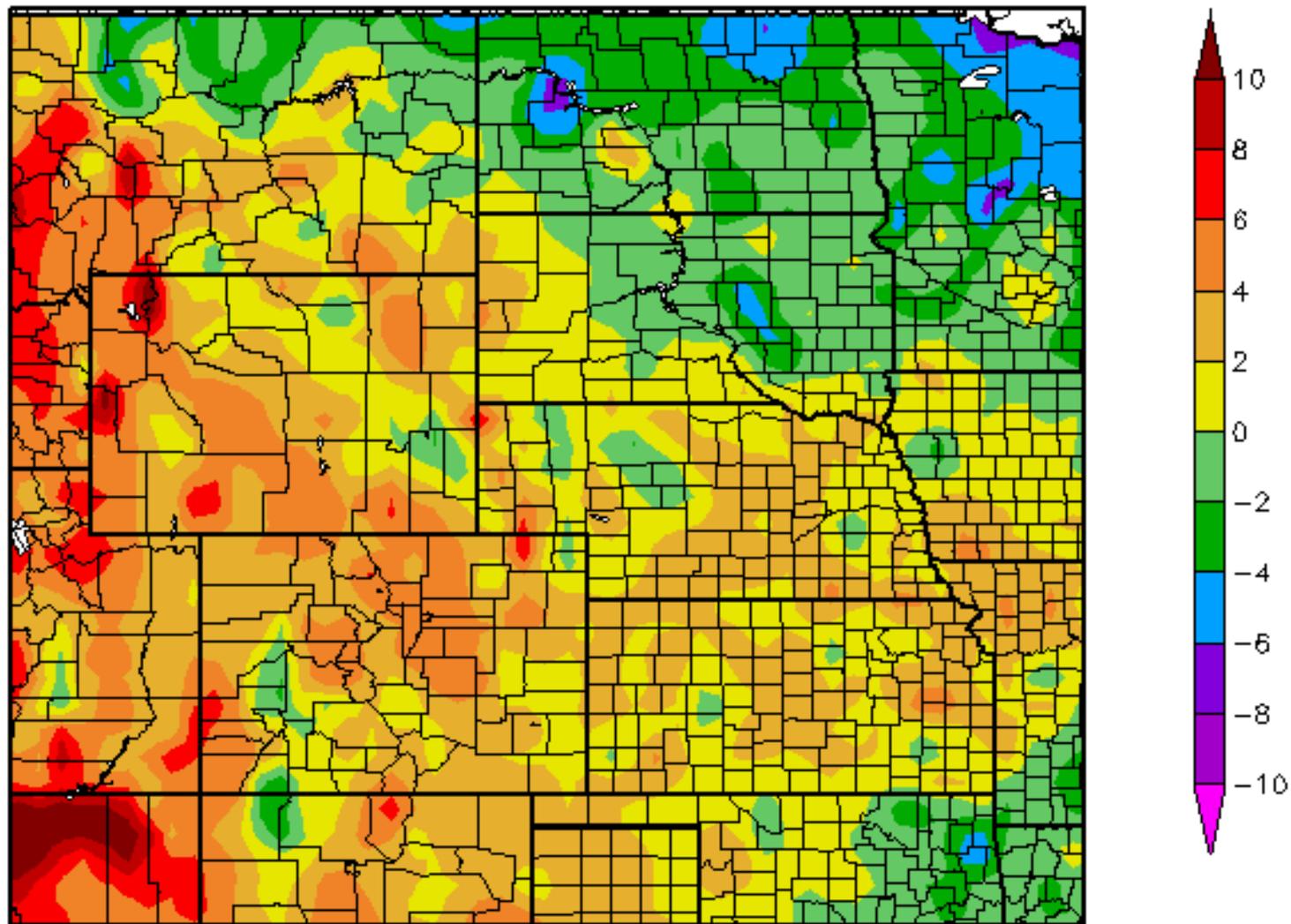


COLORADO RIVER NEAR COLORADO-UTAH STATELINE

# Water Demand

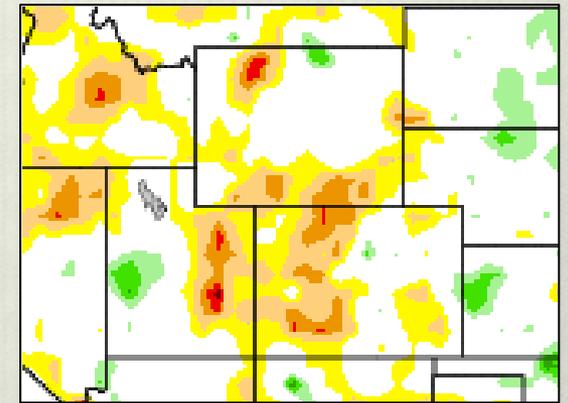
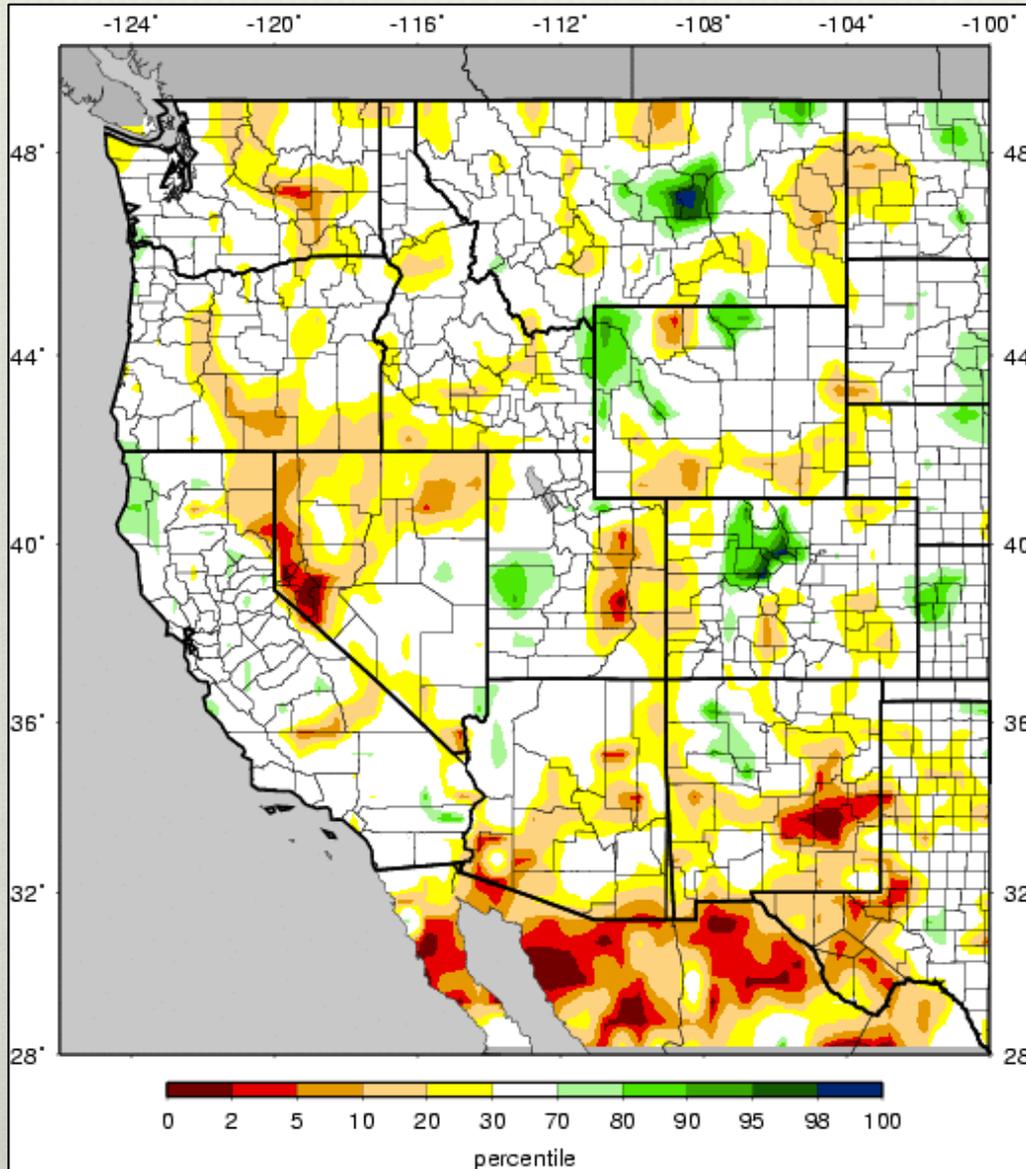


# Temperature Departure from Normal 04/16/2012 – 04/22/2012



# VIC Soil Moisture

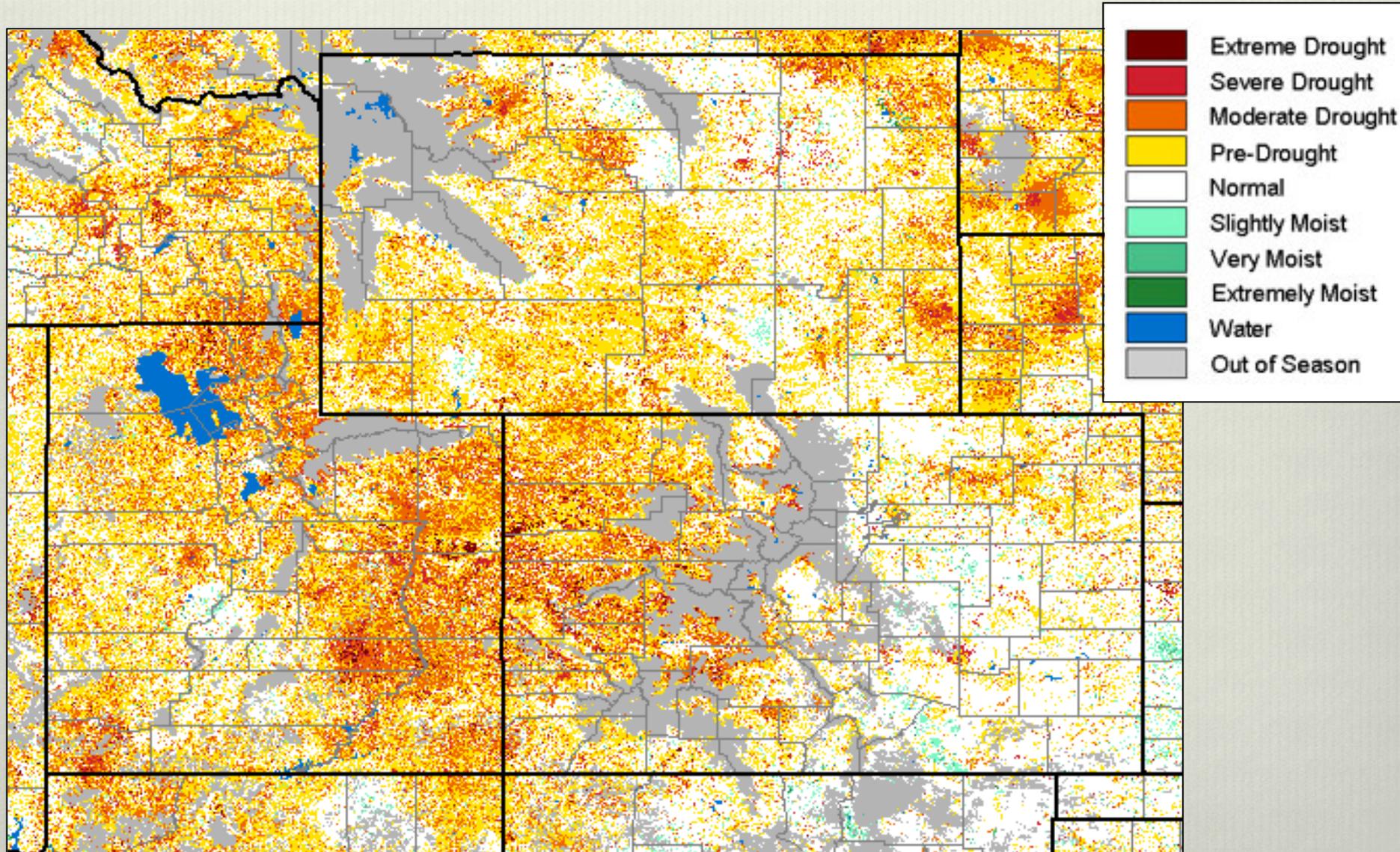
## 22 April 2012



**SWE + SOIL MOISTURE =  
TOTAL MOISTURE  
STORAGE**

# eMODIS VegDRI Vegetation

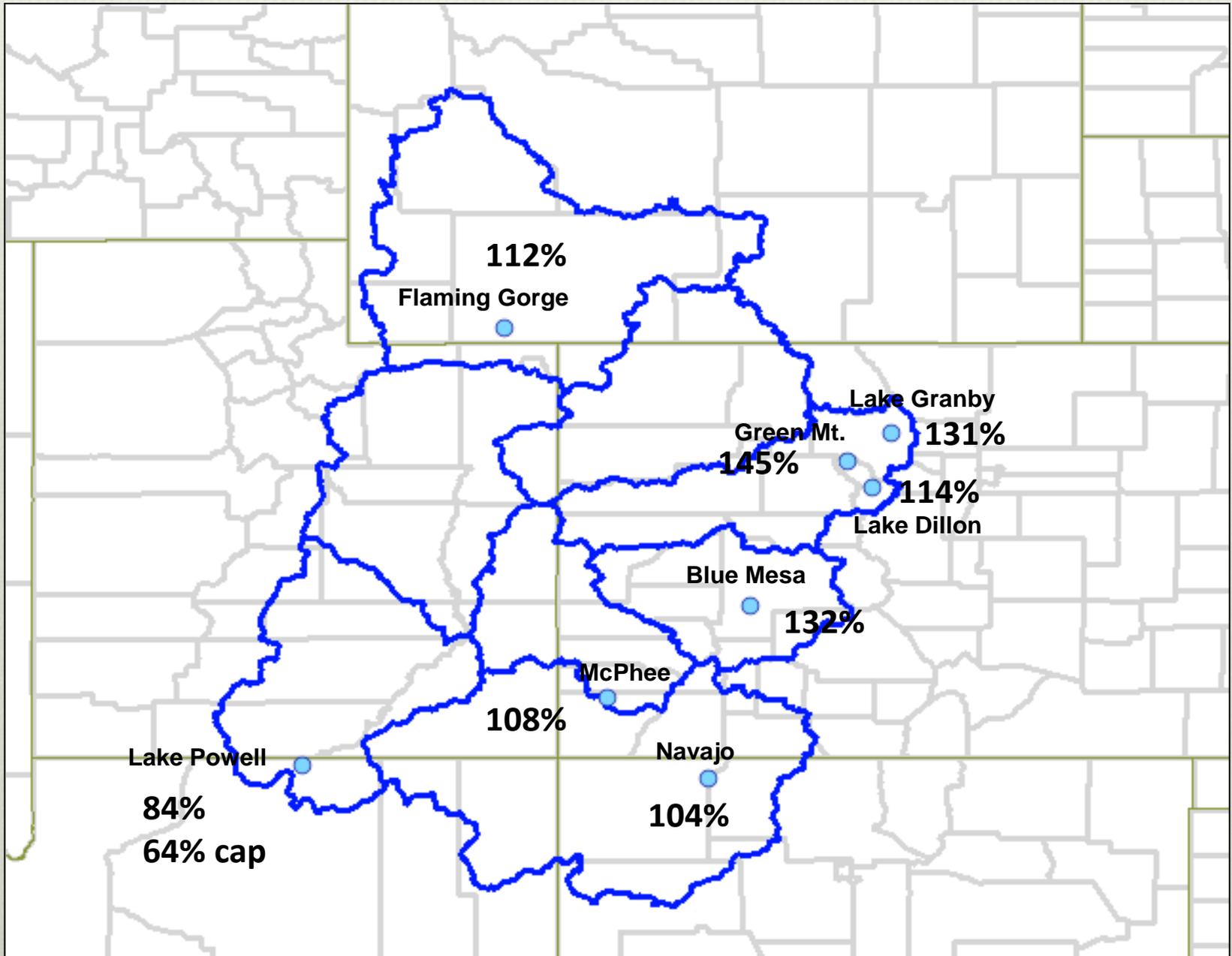
## 22 April 2012



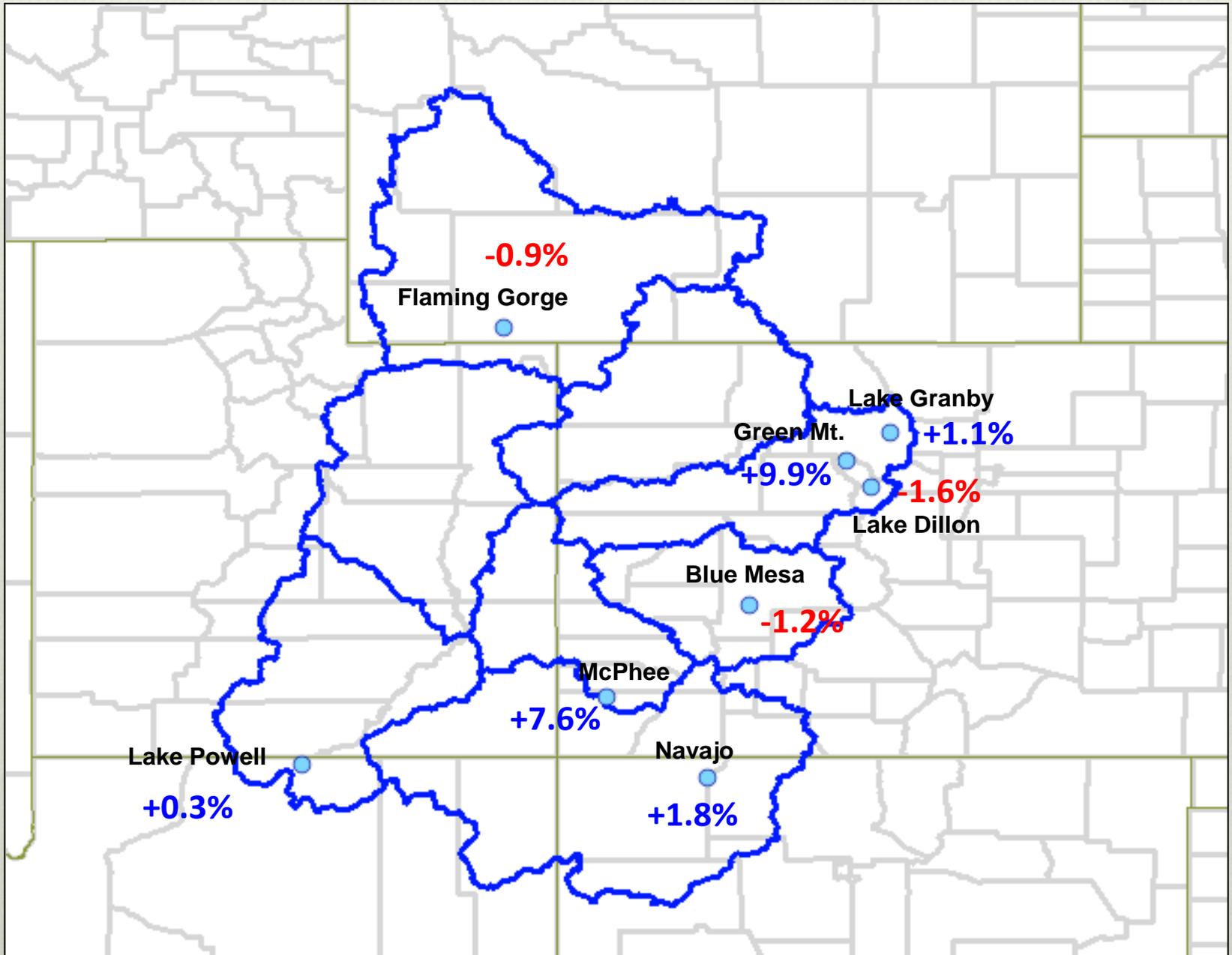
# Reservoir Update



# April Average Reservoir Storage Volume

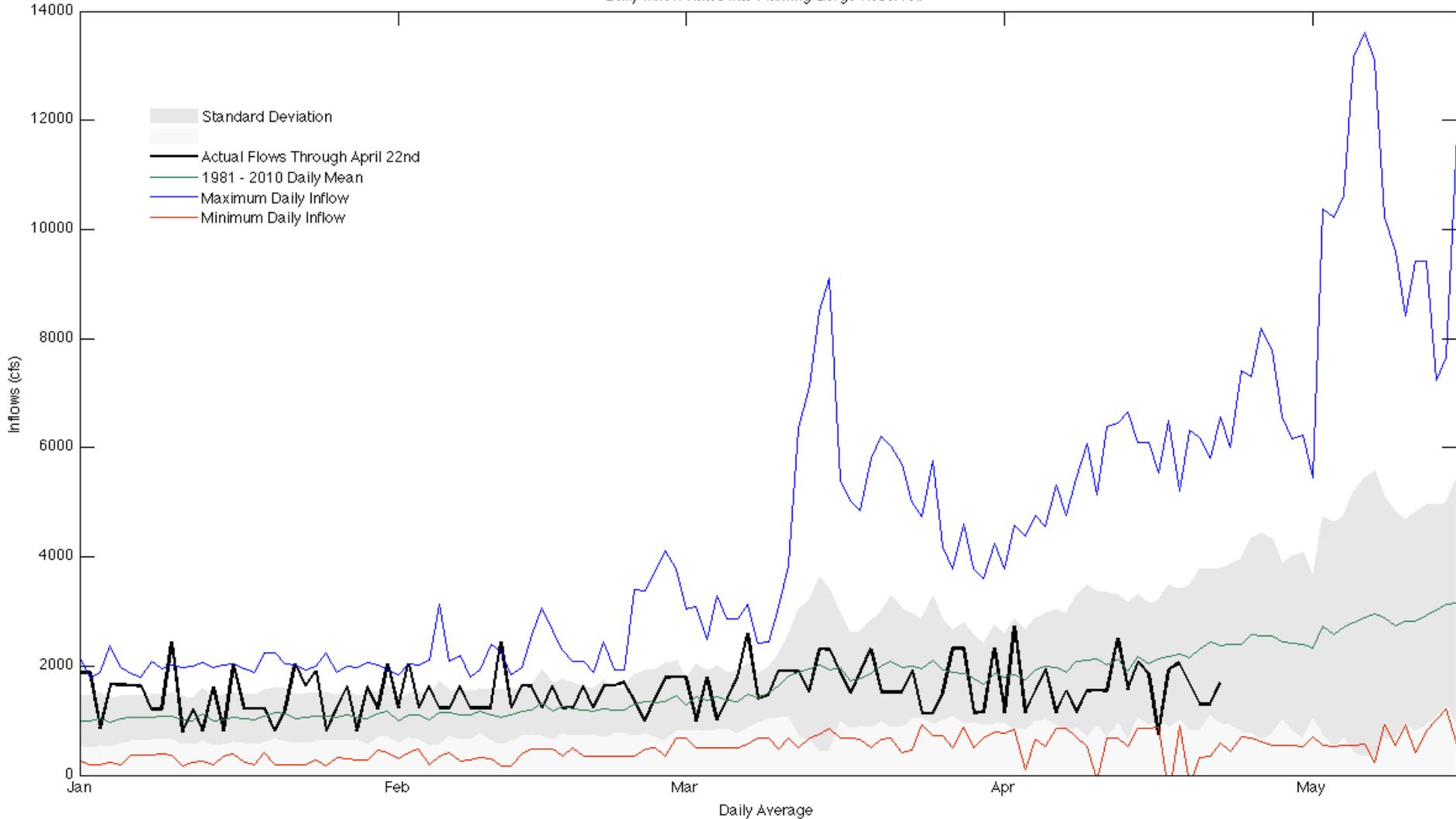


# April Reservoir Storage Volume Change



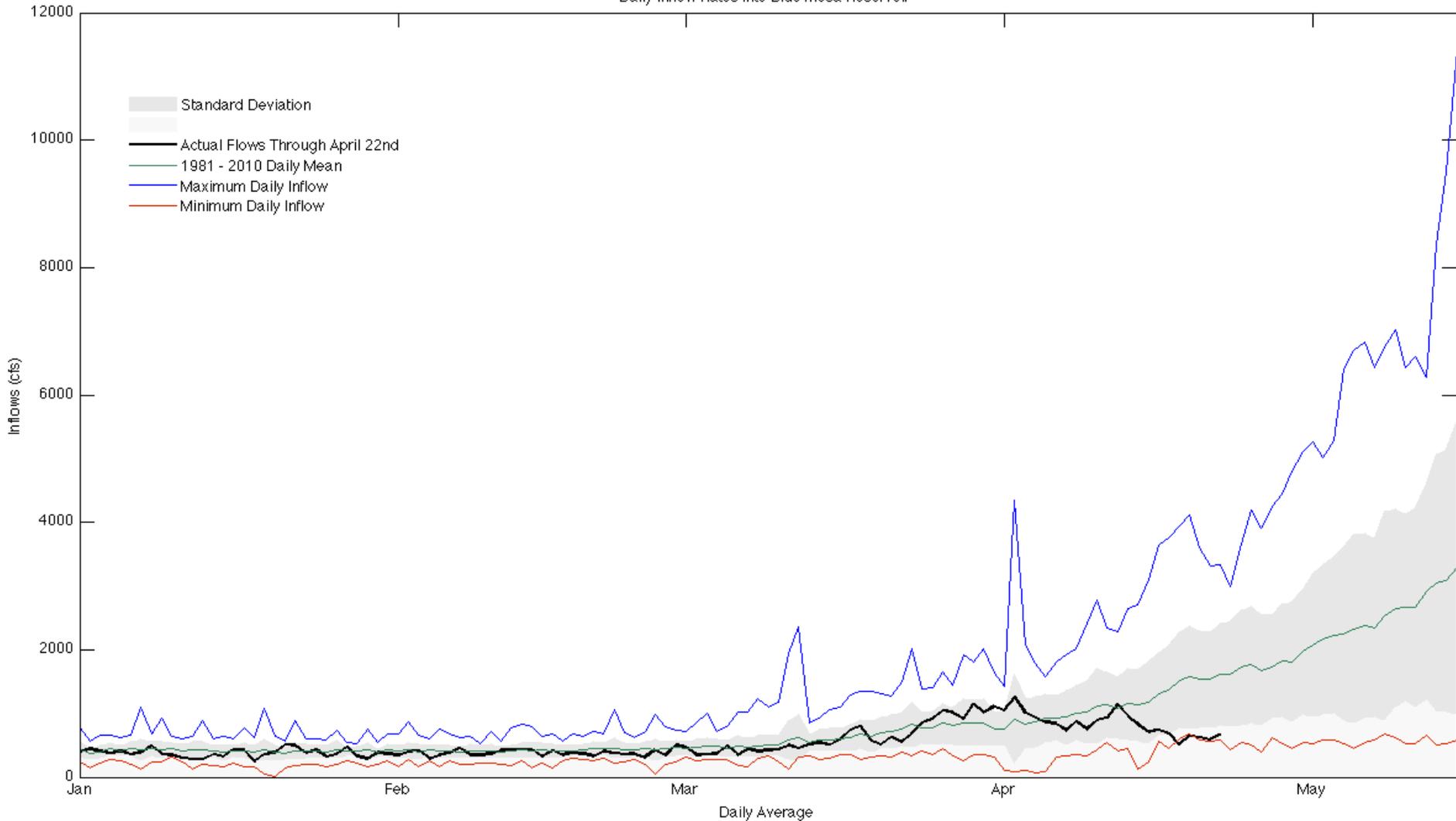
# Flaming Gorge Daily Inflows

Daily Inflow Rates into Flaming Gorge Reservoir

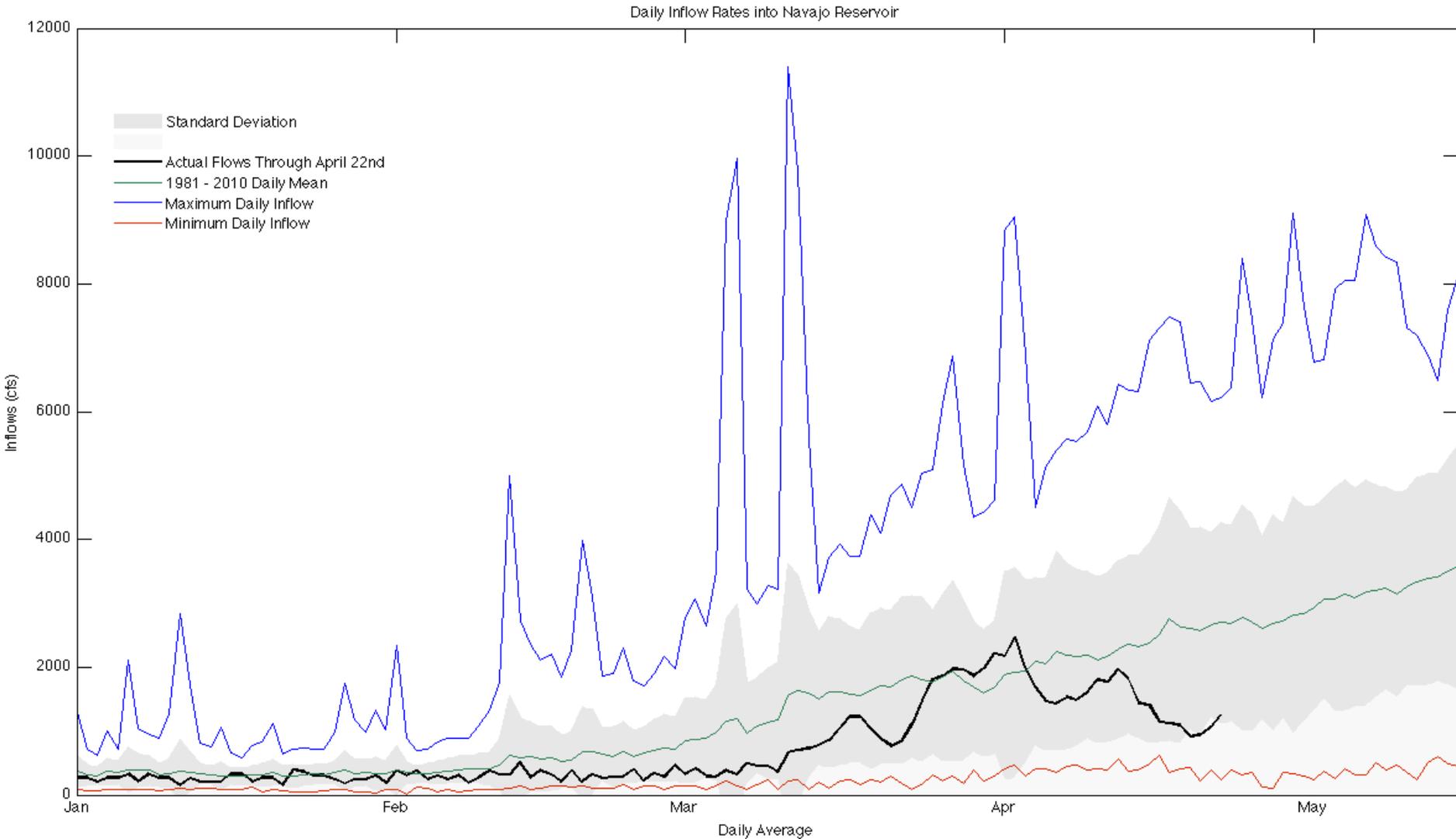


# Blue Mesa Daily Inflows

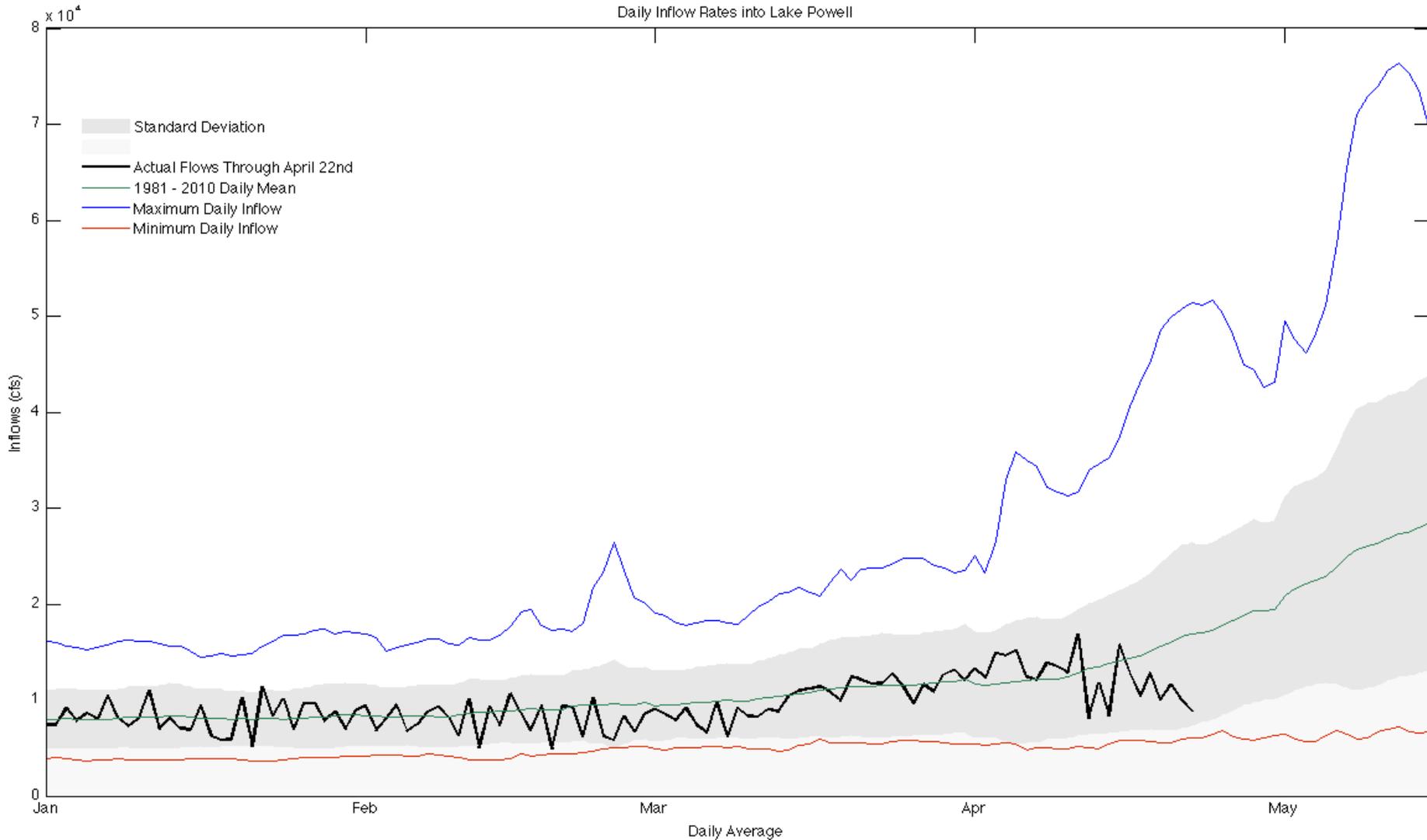
Daily Inflow Rates into Blue Mesa Reservoir



# Navajo Lake Daily Inflows

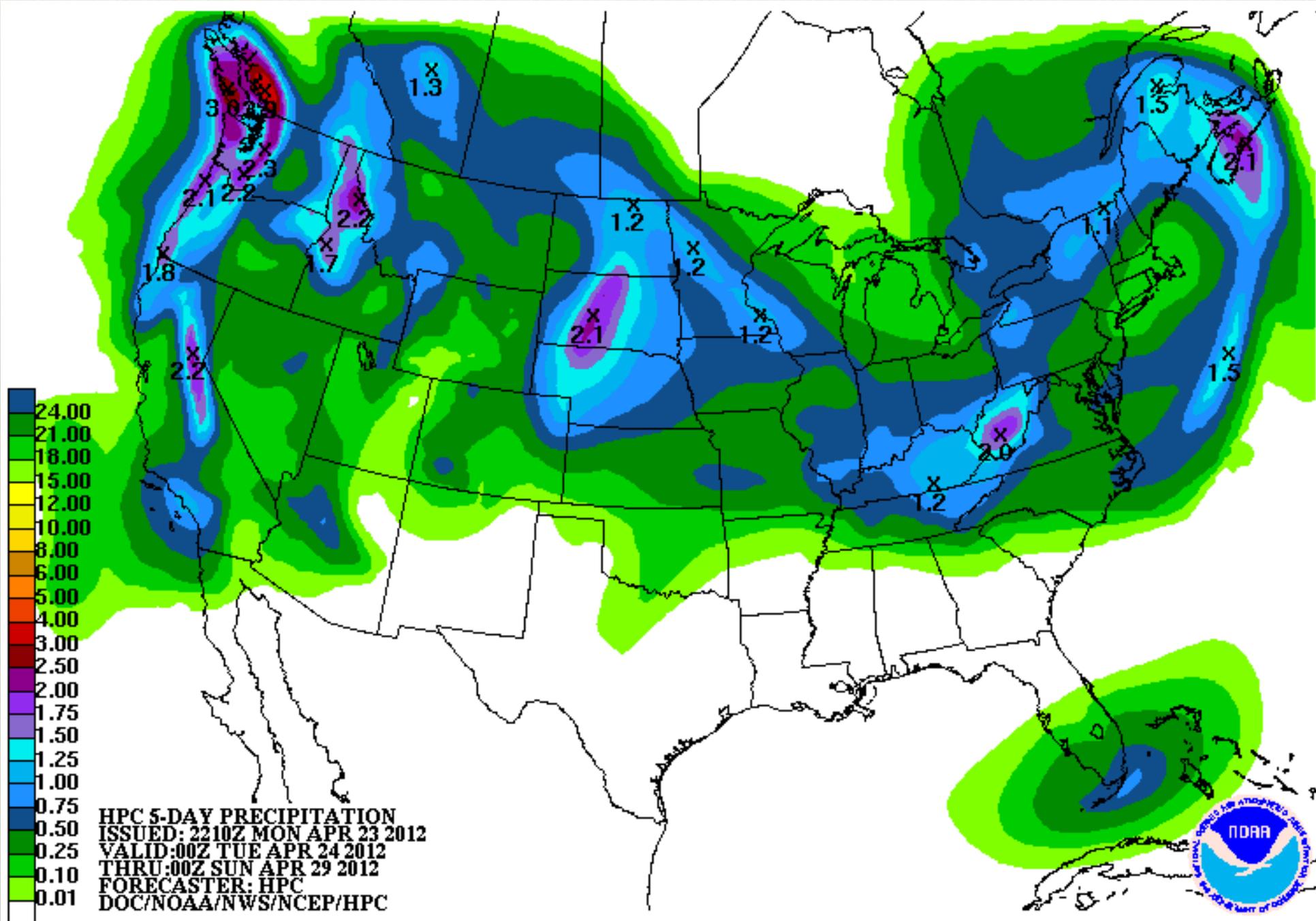


# Lake Powell Daily Inflows



# Precipitation Forecast







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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

April 24, 2012

# Precipitation and Snowpack

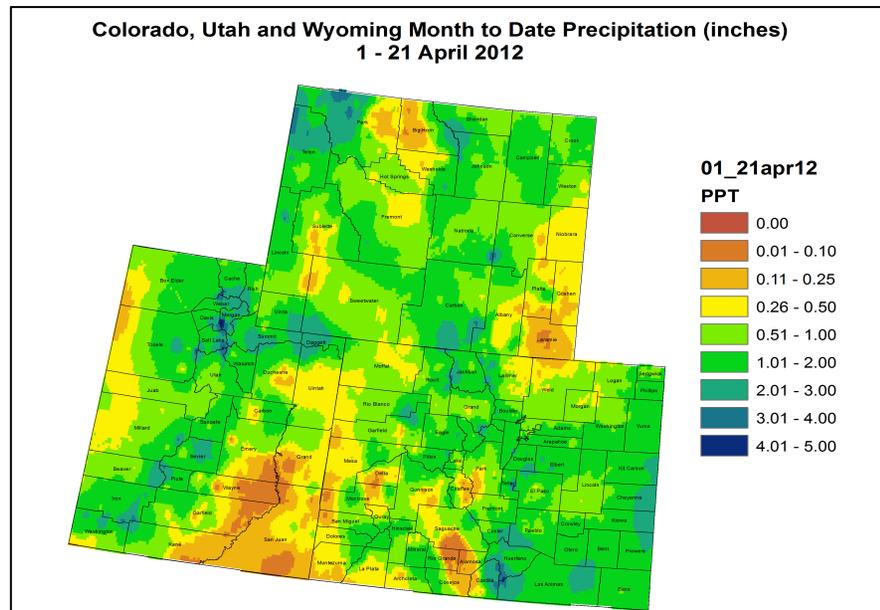


Fig. 1: April month-to-date precipitation in inches.

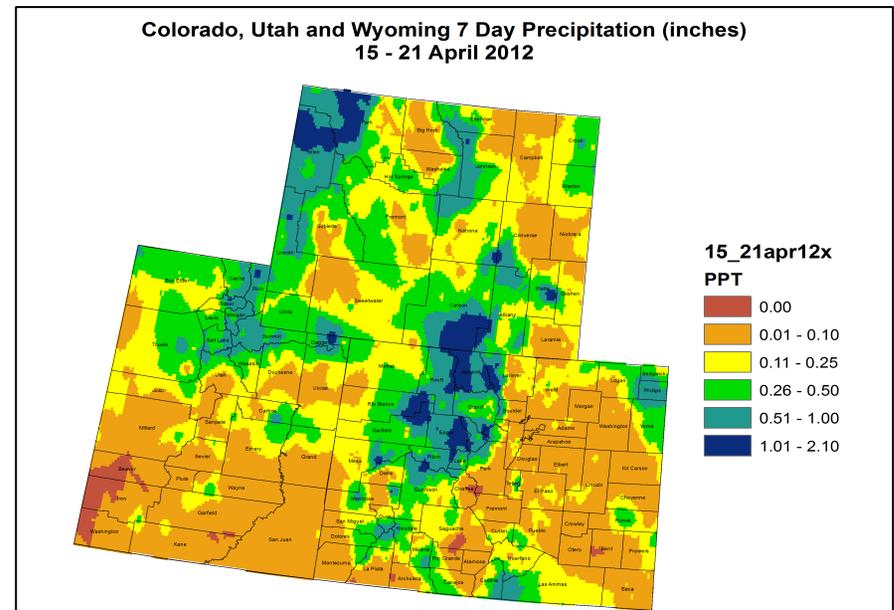
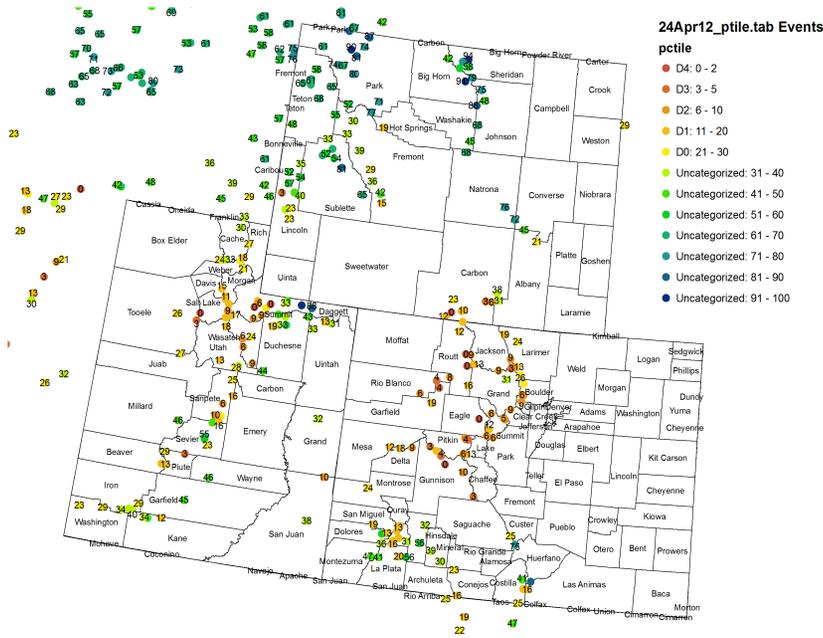


Fig. 2: April 15 – 21 precipitation in inches.

Since the beginning of the month, the Upper Colorado River Basin (UCRB) higher elevations have seen precipitation amounts ranging between 1 and 2 inches, with spotty amounts of over 2 inches in the Wasatch and Uintah ranges in Utah (Fig. 1). The lower elevations of western Colorado and eastern UT have received amounts ranging between a quarter inch and 1 inch, with the Colorado River valley just above Lake Powell receiving less than a quarter inch since the beginning of the month. Most of CO, east of the UCRB, has received between half an inch and 2 inches of precipitation, while the San Luis Valley has been drier, seeing less than a tenth of an inch for the month.

Last week, the heaviest precipitation fell in the northern and central mountains of CO with many areas currently in a severe drought receiving between half an inch and 2 inches of moisture (Fig. 2). Though beneficial, these amounts are only near average for this time of year. The mountains of northeast UT and southwest Wyoming received between a quarter and half inch of precipitation for the week while the southern part of the UCRB and much of eastern CO received less than a tenth of an inch.

Snotel Water Year Precipitation Percentile Ranking for 23 April 2012 (Stations with 15+ years of data only)



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

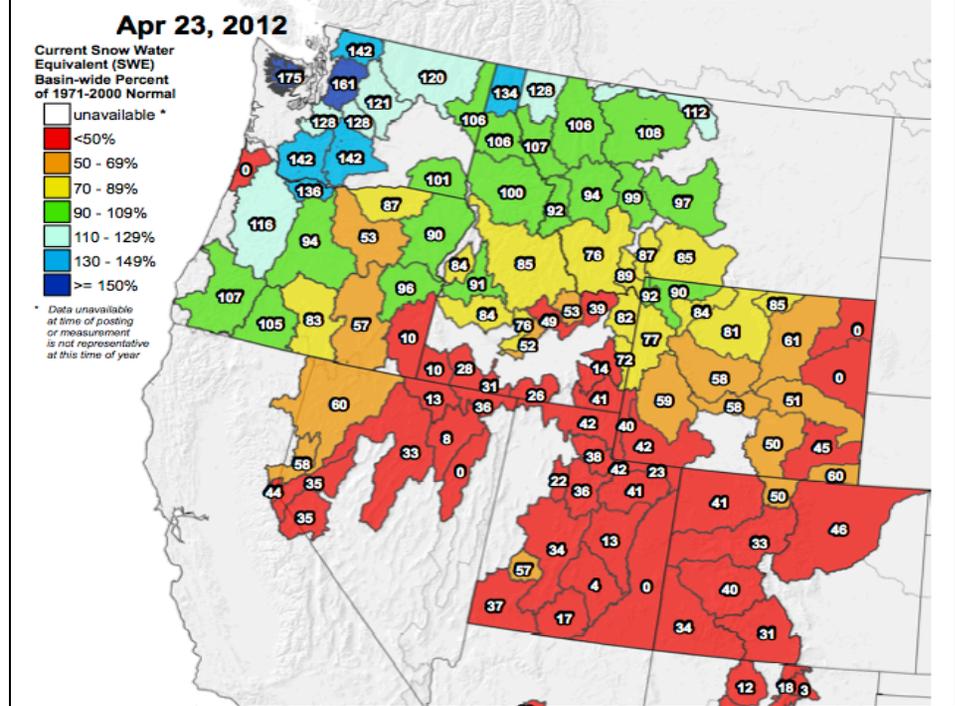


Fig. 3: SNOTEL WYTD precipitation percentiles (50% is median, 21 – 30% is Drought Monitor D0 category).

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

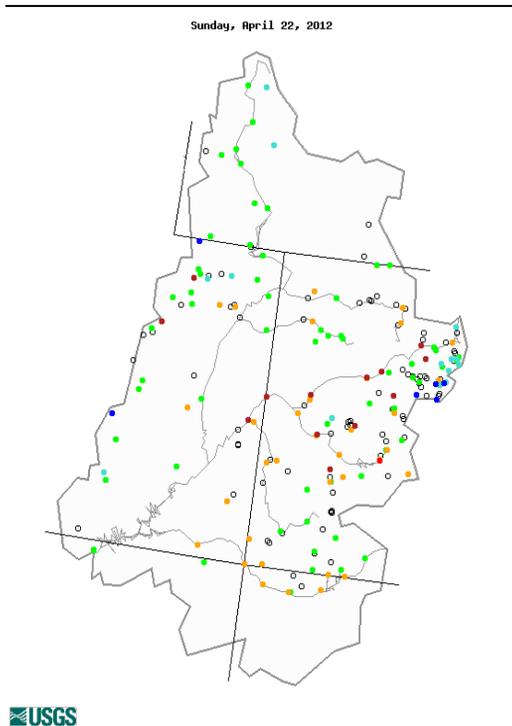
Water-year-to-date (WYTD), SNOTEL precipitation percentiles are lowest for the northern and central mountains of CO, with percentiles ranging from single digits to around the 20<sup>th</sup> percentile (Fig. 3). The Wasatch range in UT is also fairly dry, with many SNOTEL sites showing percentiles in the teens. SNOTEL percentiles in the Upper Green basin in WY are generally above the 50<sup>th</sup> percentile. In the San Juan basin, many SNOTEL percentiles are above the 30<sup>th</sup> percentile, but there are an increasing number of SNOTELs now recording below the 30<sup>th</sup> percentile.

Snowpack conditions around the UCRB are all well below average (Fig. 4), as a combined result of less than average seasonal snowpack accumulations and much earlier melting (seasonal peaks one month earlier than normal). All of the sub-basins in eastern UT and western CO are showing SWE values below 40% of average. Nearly all of the snowpack in the far eastern UT sub-basin has completely melted out. The northern-most sub-basin in the UCRB in WY is still above 50% of average.

# Streamflow

As of April 22<sup>nd</sup>, 63% of the USGS streamgages in the UCRB recorded normal (25<sup>th</sup> – 75<sup>th</sup> percentile) or above normal 7-day average streamflows (Fig. 5). About 16% of the gages in the basin are recording above normal flows, while about 37% of the gages in the basin are recording below normal flows (up from 13% last week). Most of the gages on the Green River in WY are showing near normal flows, while streamflow on the San Juan River is below normal, and flows on the Colorado River are mostly in the much below normal range.

The three key gages in the UCRB continue to show decreasing flows for the past week (Fig. 6). Flows on the Green River at Green River, UT are in the near normal range, at the 42<sup>nd</sup> percentile, while flows on the San Juan River near Bluff, UT are below normal at the 17<sup>th</sup> percentile. Flows on the Colorado River near the CO-UT state line have rapidly dropped from the 57<sup>th</sup> percentile two weeks ago to the 5<sup>th</sup> percentile this week. This drop off is possibly a combination of diversions, temperature fluctuations, and less snowpack melt-off than what is normal for this time of year.



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 22<sup>nd</sup>.

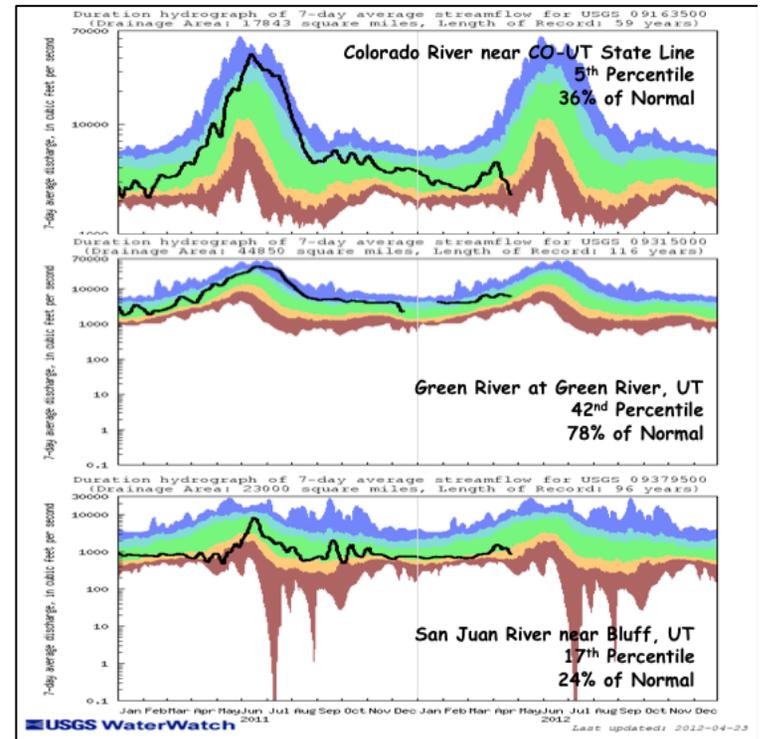


Fig. 6: USGS 7-day average discharge over time at the CO-UT stateline (top), Green River, UT (middle) and Bluff, UT (bottom).

# Water Supply and Demand

Most of the UCRB experienced above average temperatures for the week, with much of the western and southern portions of the UCRB seeing temperatures 4 to 6 degrees above average. Much of eastern CO also experienced warmer than average temperatures last week. The VIC model shows dry soil moisture conditions in eastern CO, in UT around the Colorado River and Green River valleys, and in southern WY (Fig. 7). The VIC shows very wet soils around the Colorado headwaters region (likely due to early melting of snowpack infiltrating the soils). However, when VIC SWE and soil moisture are combined, this UCRB shows a moisture storage deficit (Fig. 7).

All of the reservoirs above Lake Powell are currently above their April storage averages. Lake Dillon and Flaming Gorge have seen storage volume decreases since the beginning of the month. Blue Mesa (which had been increasing in volume) has seen volume decreases in the past week. The rest of the major reservoirs have been increasing in volume since the beginning of the month. Lake Powell is currently at 84% of average and 64% of capacity (compared to 52% one year ago).

## Precipitation Forecast

A strong ridge of high pressure currently over the UCRB will hold through Wednesday before gradually moving east by the end of the week. This will allow a trough of low pressure over the west coast to begin moving over the Great Basin and bring a return to unsettled conditions for the weekend. Moisture streaming over the UCRB in advance of this trough will help spark showers and thunderstorms on Thursday with an increase in coverage on Friday. Expect to see mostly rain, with the highest elevations seeing snow, until Saturday, when a push of cool air from the north brings in lower temperatures and a reinforcing shot of moisture. Liquid accumulations of 0.50 to 0.75 inches will be possible across the mountains of northeast Utah and western Colorado by Sunday, with regions around the Four Corners generally staying below 0.25 inches (Fig. 8). Unsettled conditions will linger over the area through the end of the weekend before the trough begins to move out of the area on Monday.

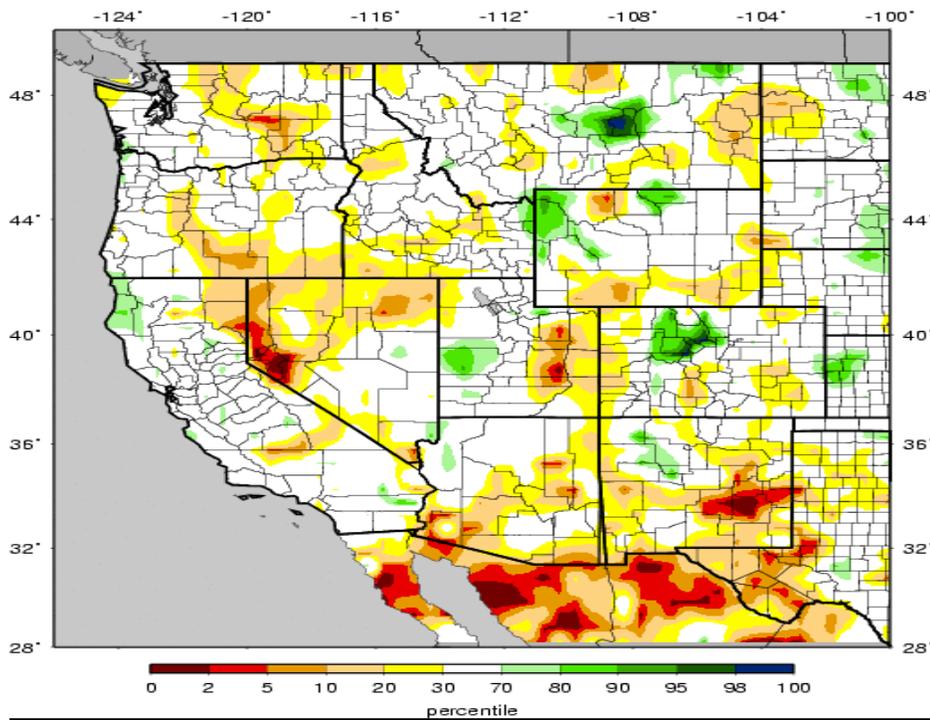


Fig. 7: VIC soil moisture percentiles as of April 22<sup>nd</sup>, with total moisture storage (SWE and soil moisture) below.

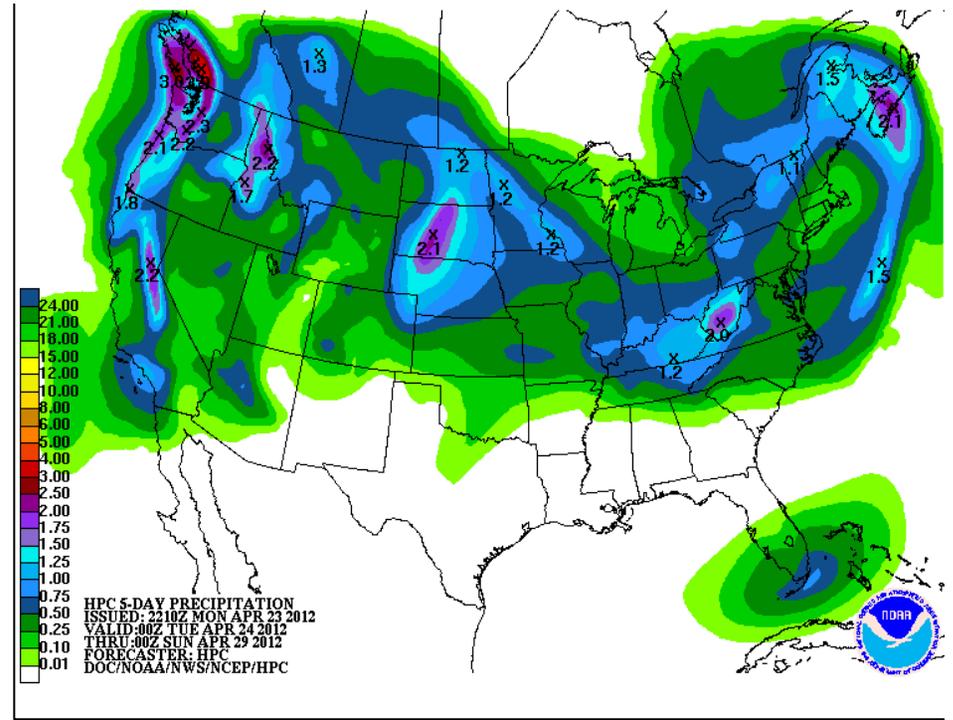
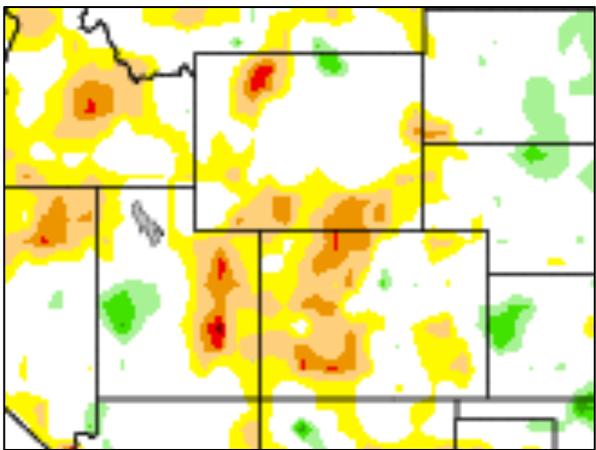


Fig. 8: Hydrologic Prediction Center's Quantitative Precipitation Forecast (QPF) through 00UTC Sunday.



# Drought and Water Discussion

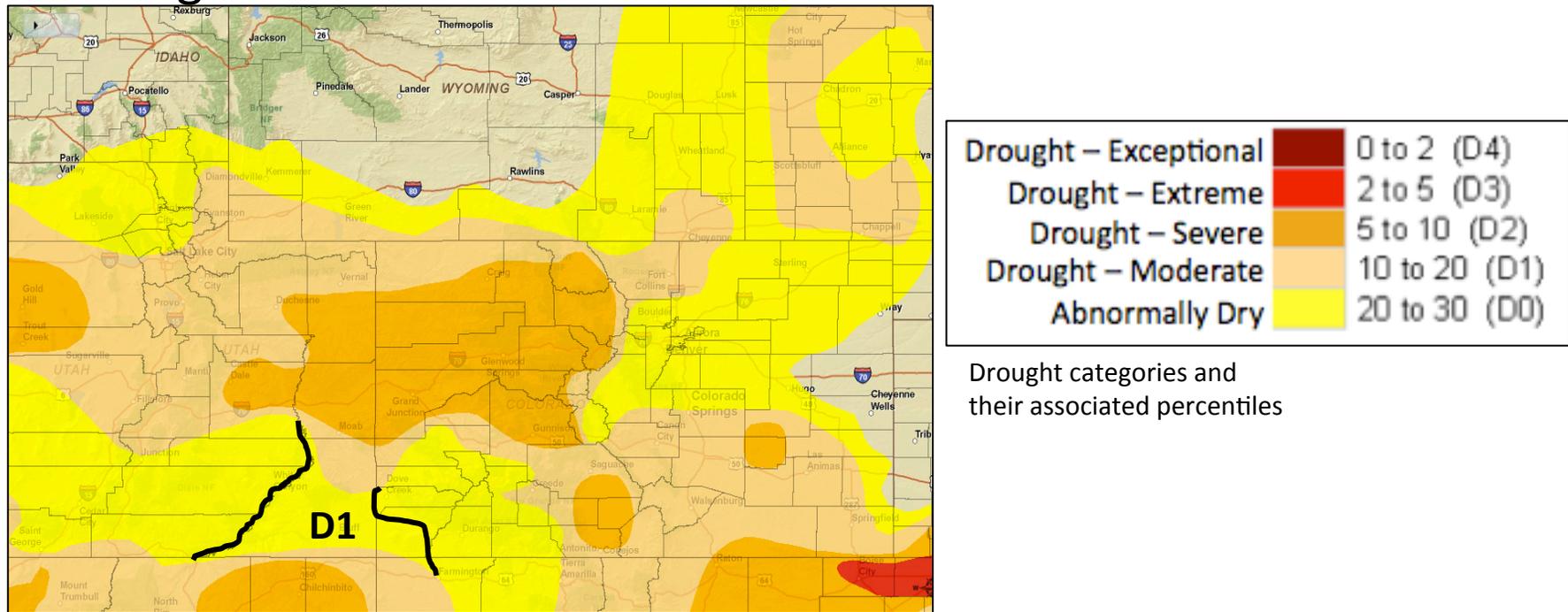


Fig. 9: April 17<sup>th</sup> release of U.S. Drought Monitor for the UCRB.

Looking at the current depiction of the U.S. Drought Monitor (USDM) map, it is recommended that the D1 be expanded in the southern portion of the UCRB (Fig. 9, black lines). The western extent of the D1 should follow the Colorado River valley, and the eastern extent will cover half of Montezuma County in CO; this will connect the two separate D1s in northeast AZ and eastern UT. 60-day standardized precipitation indices (SPIs) in this area are in the range of -1 to -1.5, and some of the 6-month timescale SPIs are also around -1. No degradations are needed for the San Juan mountains area where SNOTEL precipitation percentiles are just under the 30<sup>th</sup> percentile or a little higher. Near average precipitation fell in northwest CO last week, not enough for any improvements, but just enough to hold off on further degradations. So status quo is recommended for the rest of the UCRB. Status quo is also recommended for eastern CO. There are some locally dry spots around Morgan and Logan counties in northeast CO, so a degradation to D1 could be possible. But with the current forecast, the consensus is to wait one week and reassess the conditions there next week.