Spring 2013


# Weekly Climate, Water & Drought Assessment

# Today's Agenda

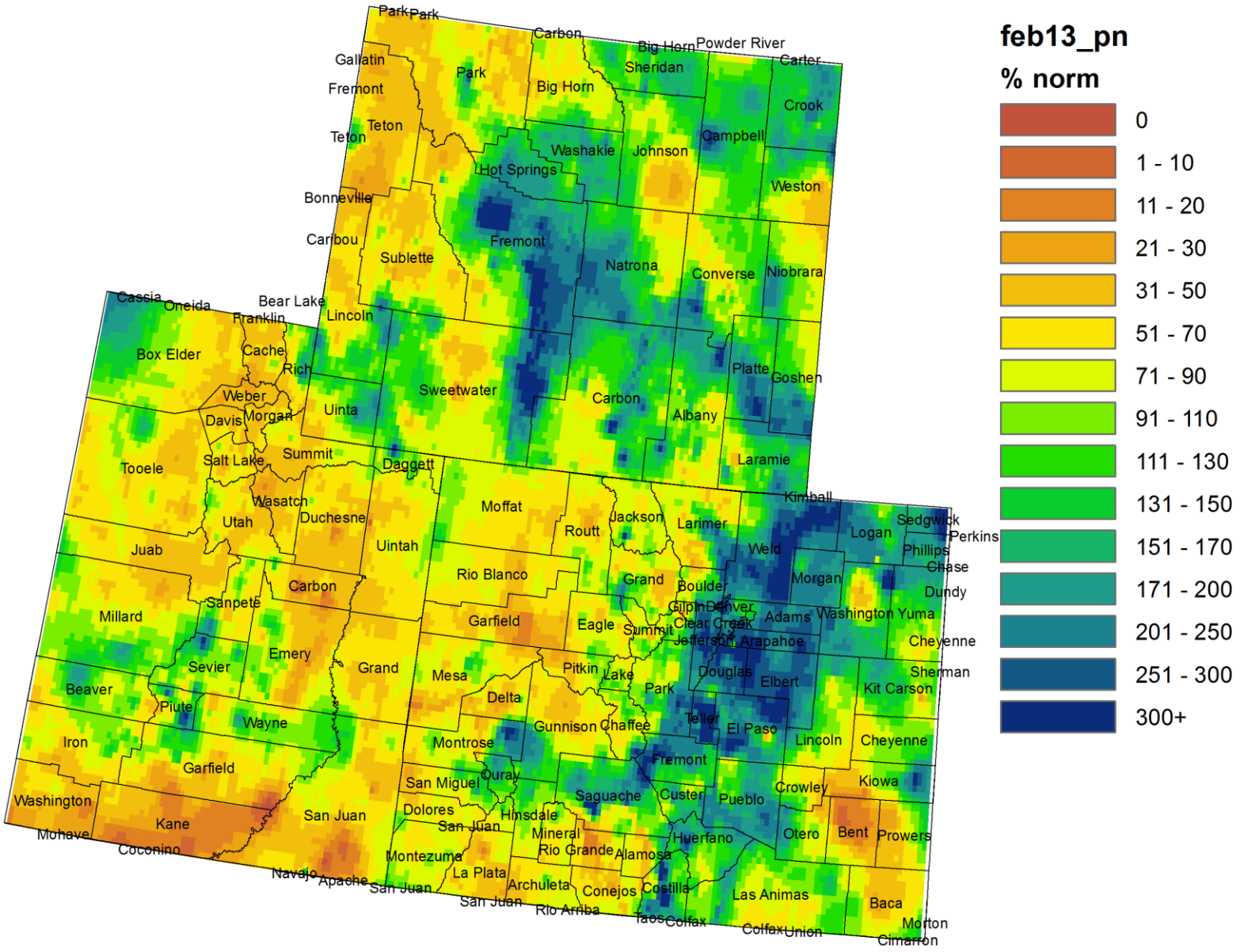
-Assessment of current water conditions

- Precipitation Forecast

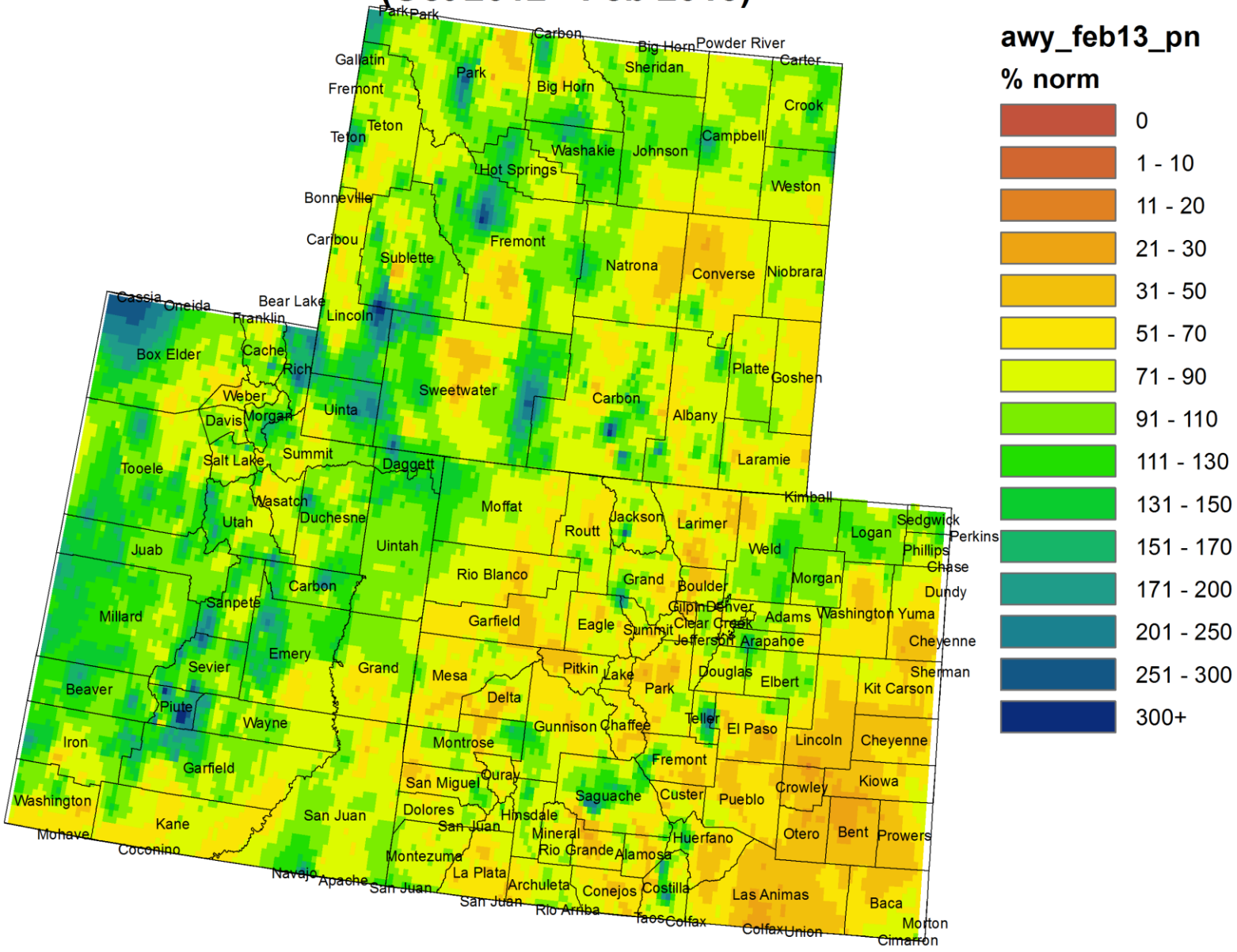
- Recommendations for Drought Monitor

# Precipitation/Snowpack Update

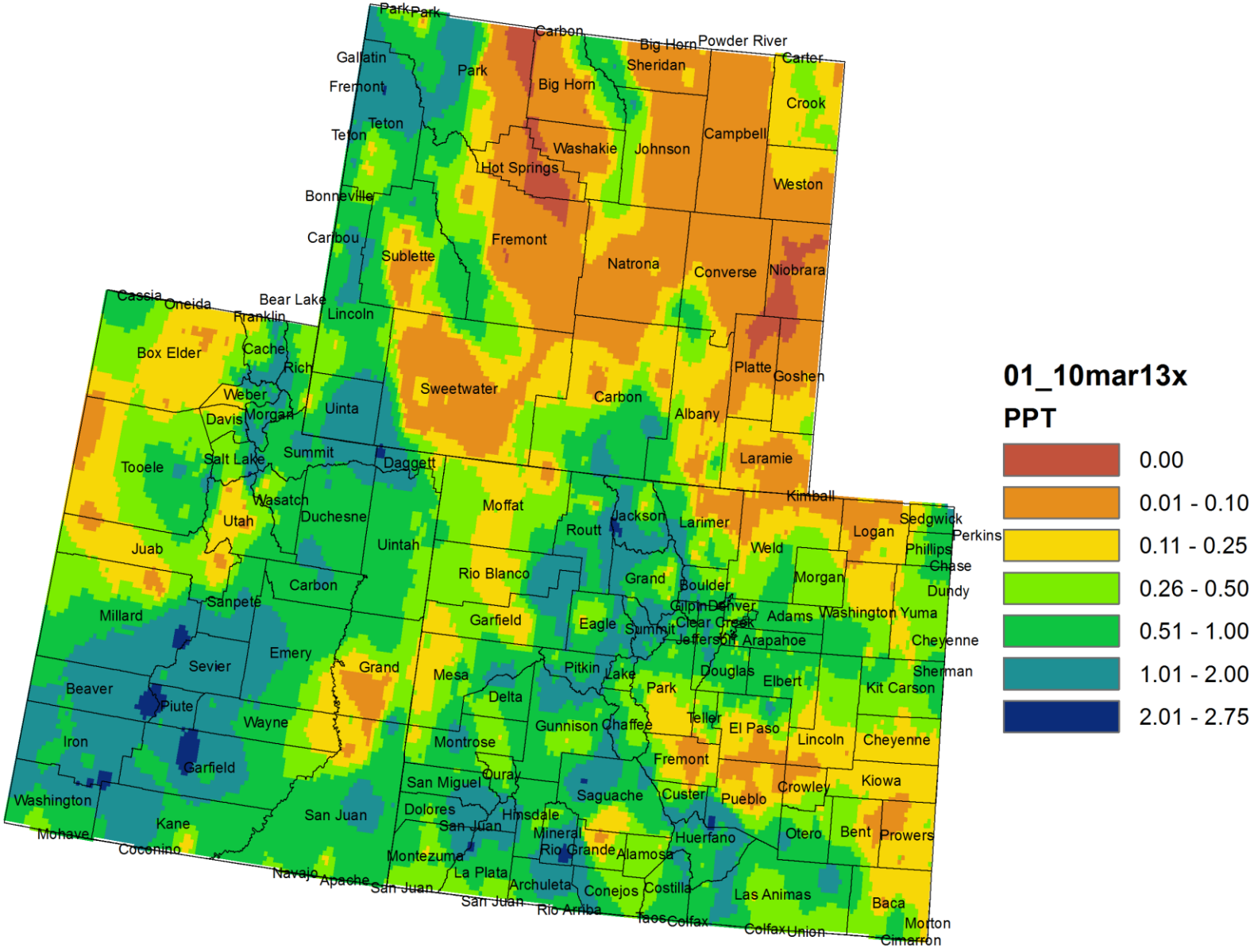
# Colorado, Utah and Wyoming February 2013 Precipitation as a Percentage of Normal



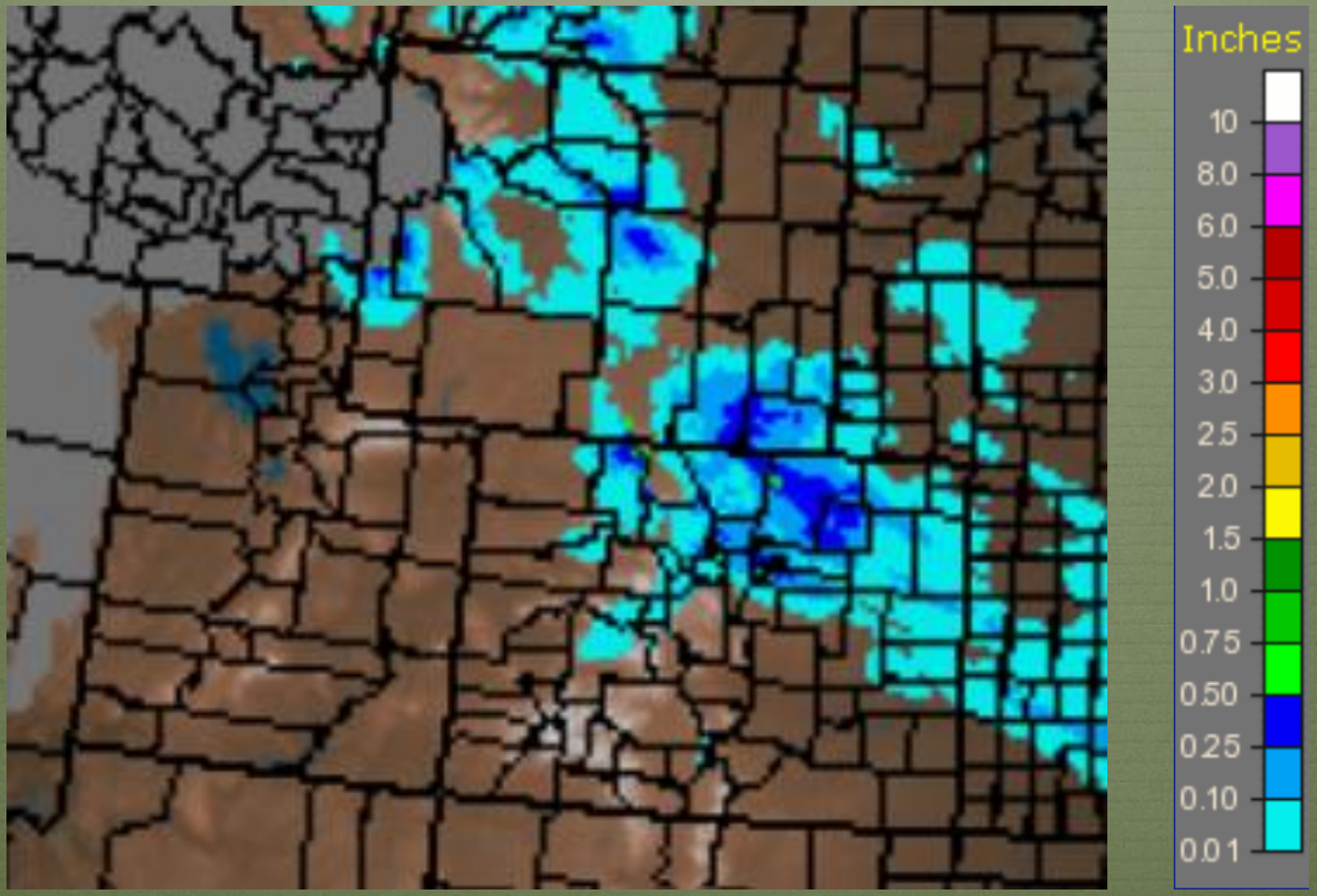
# Colorado, Utah and Wyoming Water Year 2013 Precipitation as a Percentage of Normal (Oct 2012 - Feb 2013)



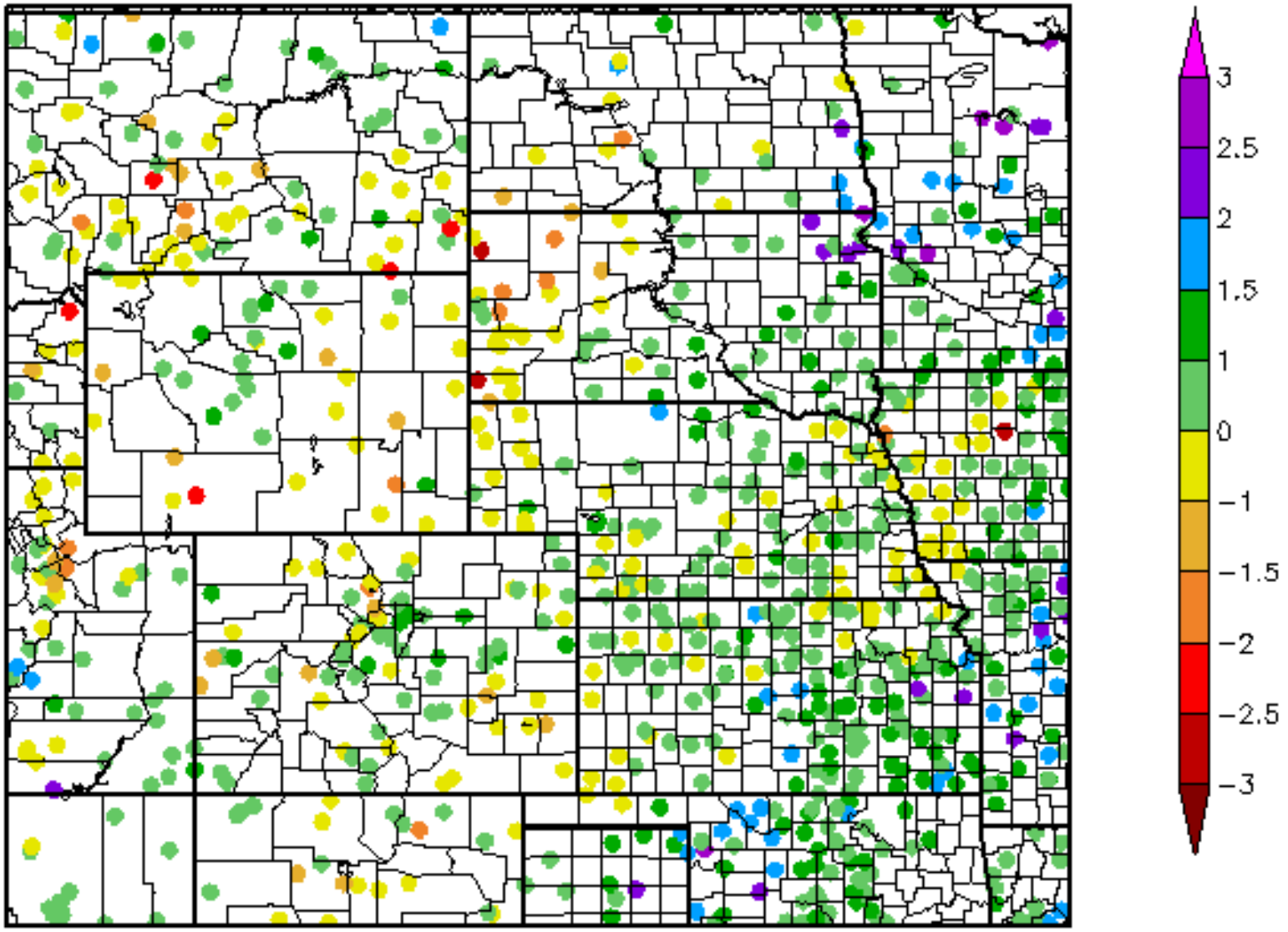
# Colorado, Utah and Wyoming Month to Date Precipitation (in)
# 1 - 10 March 2013



# AHPS Analysis 3/12/13



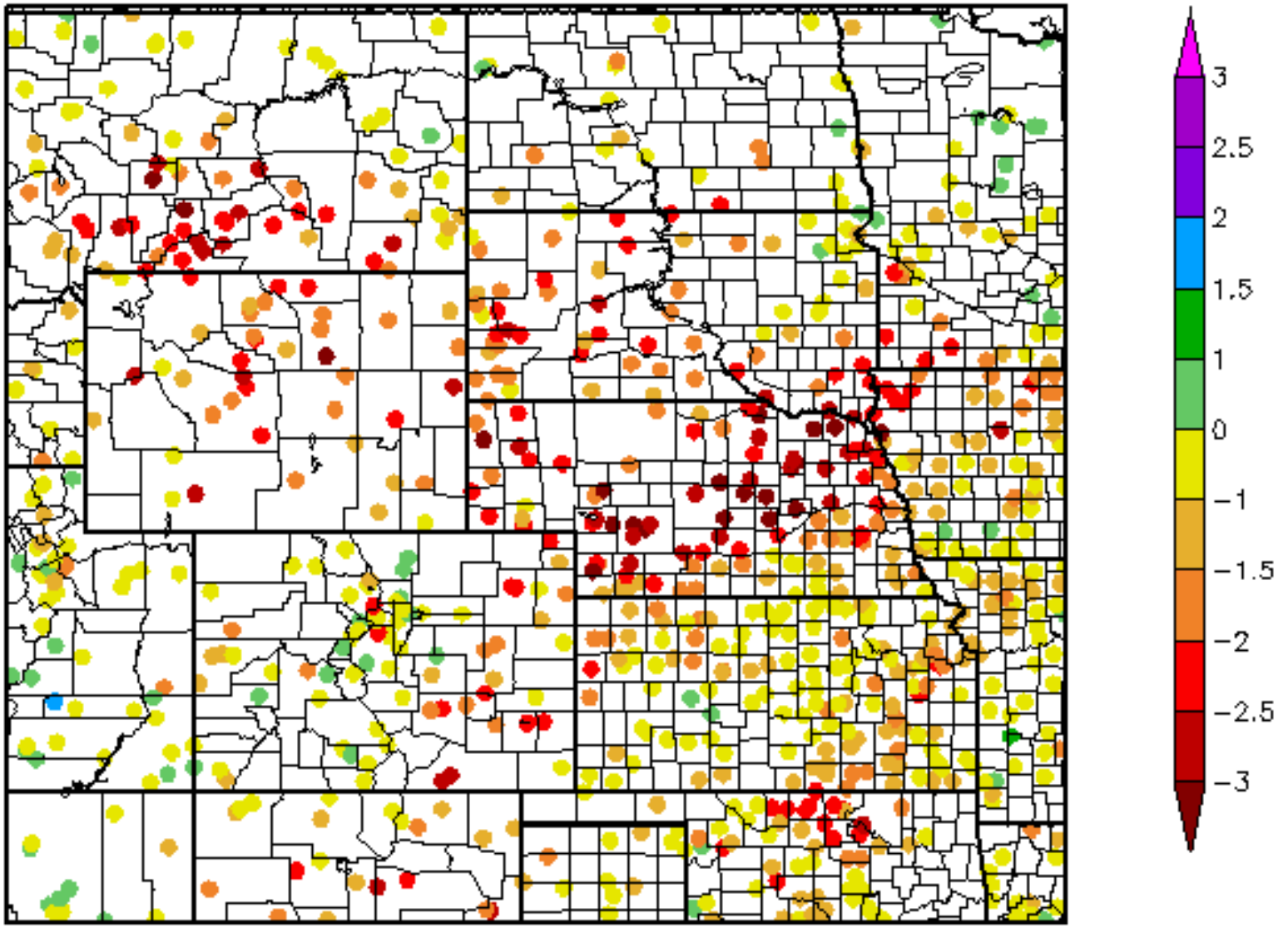
# 60 Day SPI
## 1/11/2013 – 3/11/2013




Generated 3/12/2013 at HPRCC using provisional data.

Regional Climate Centers

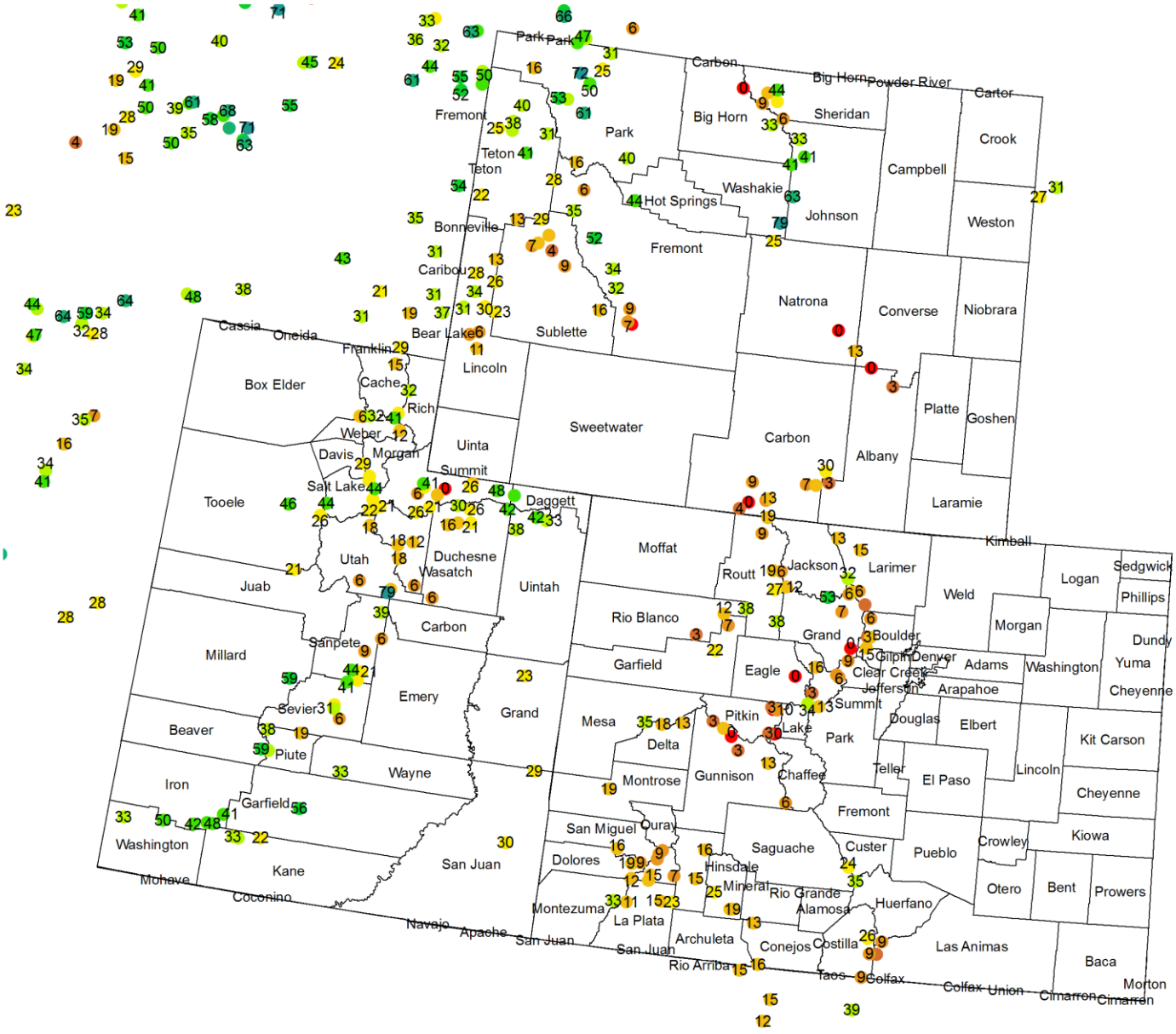
# 9 Month SPI
## 6/12/2012 – 3/11/2013




Generated 3/12/2013 at HPRCC using provisional data.

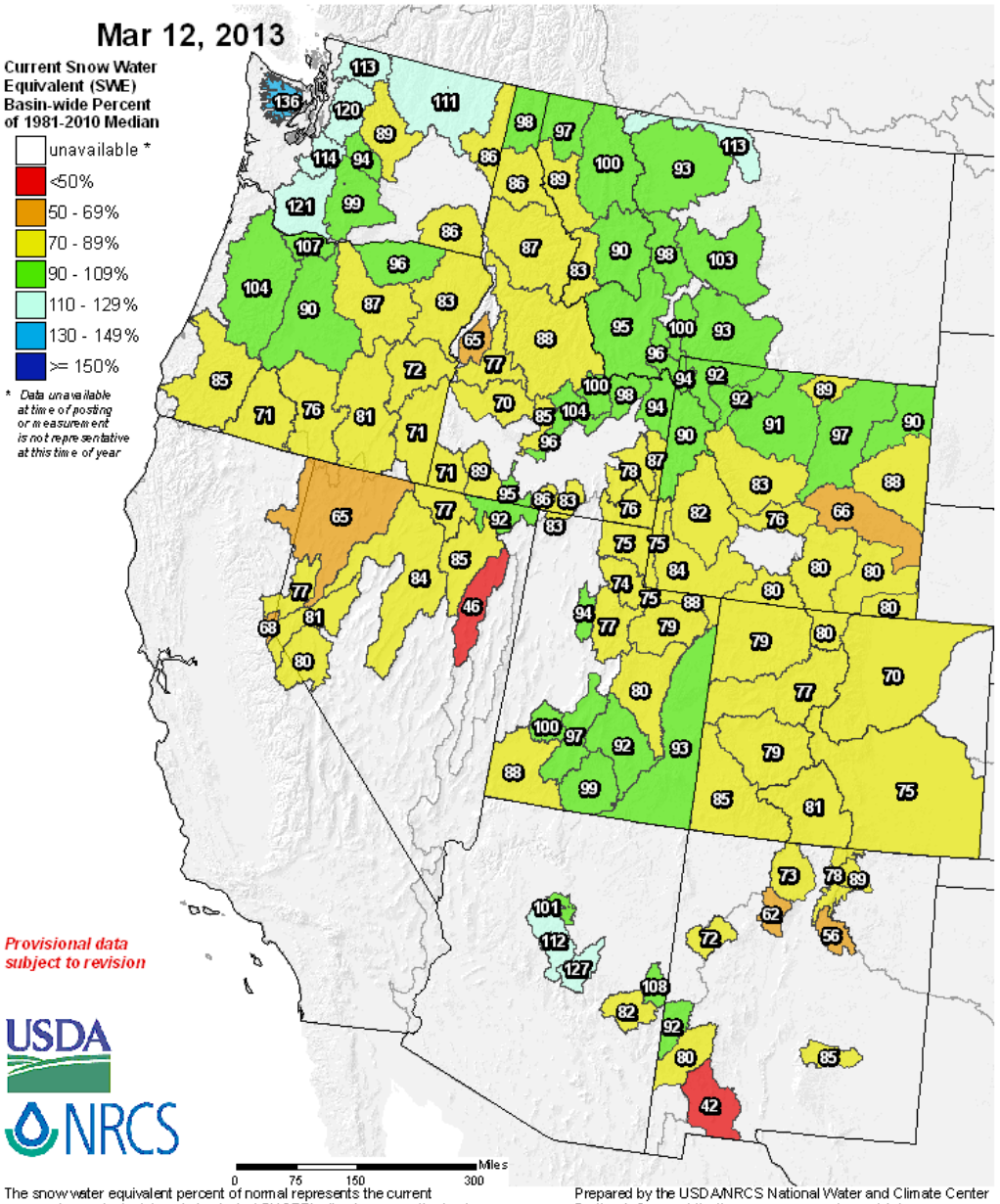
Regional Climate Centers

# Snotel Water Year Precipitation Percentile Ranking for 11 March 2013 (Stations with 15+ years of data only)



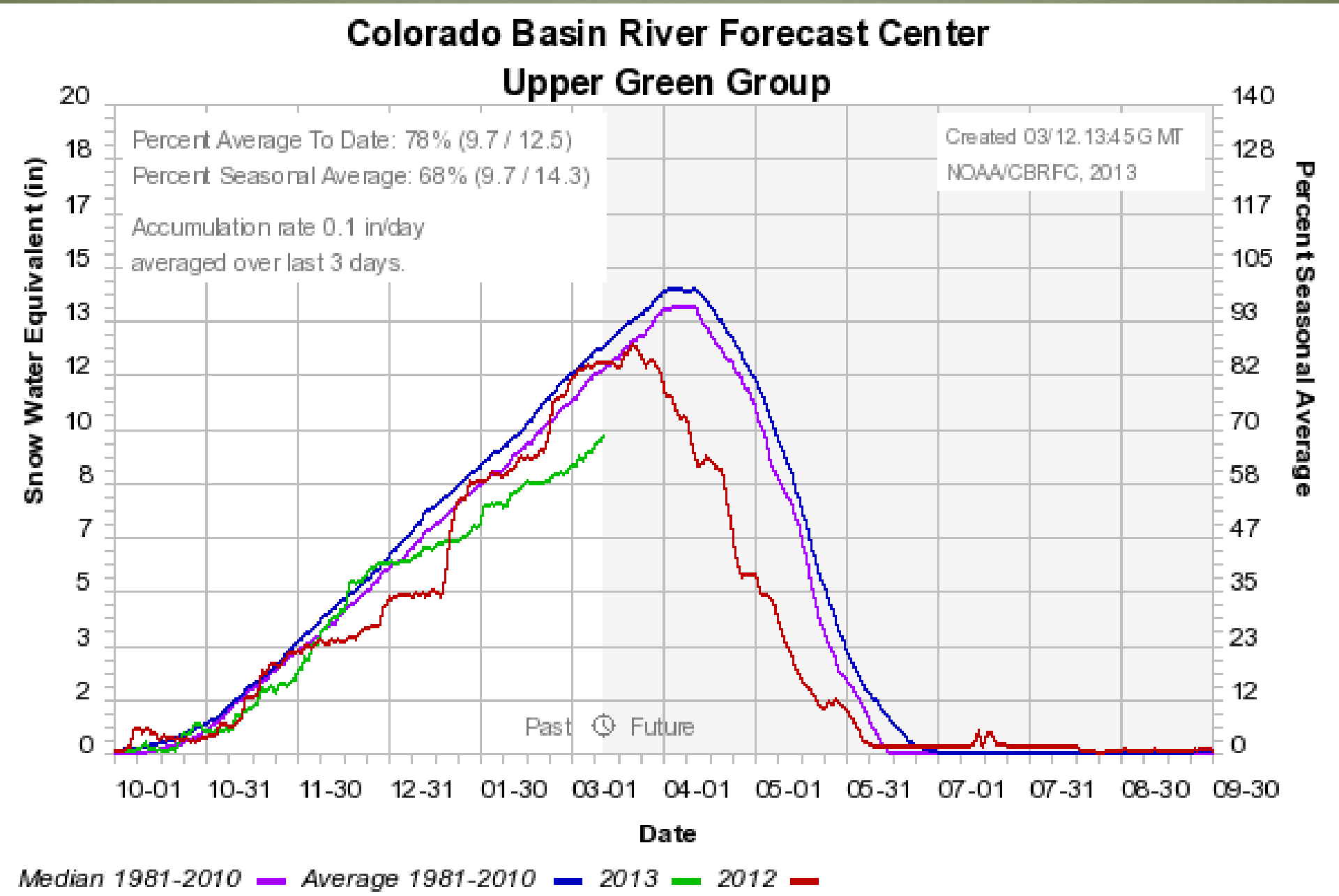
# Snowpack

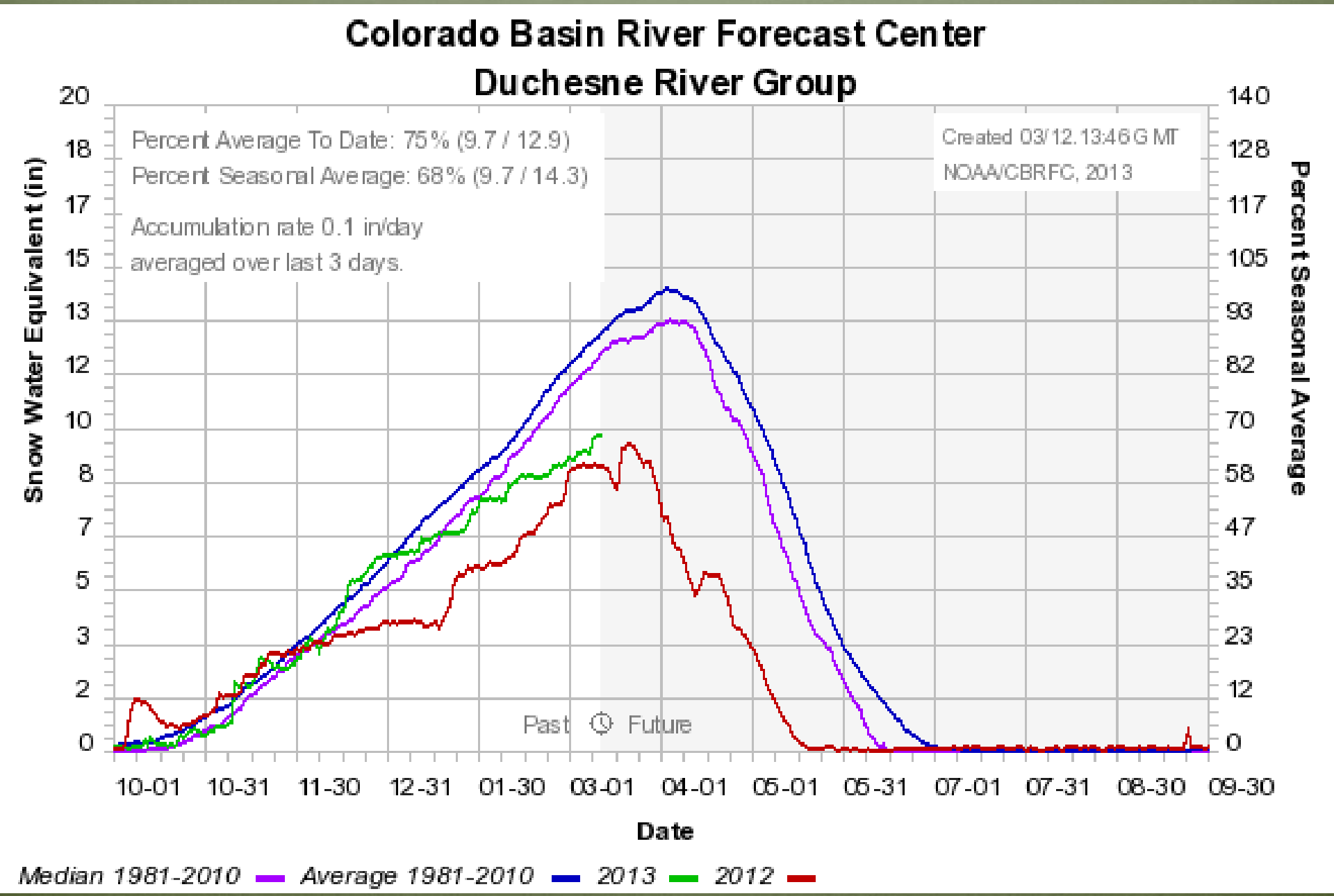
# Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal

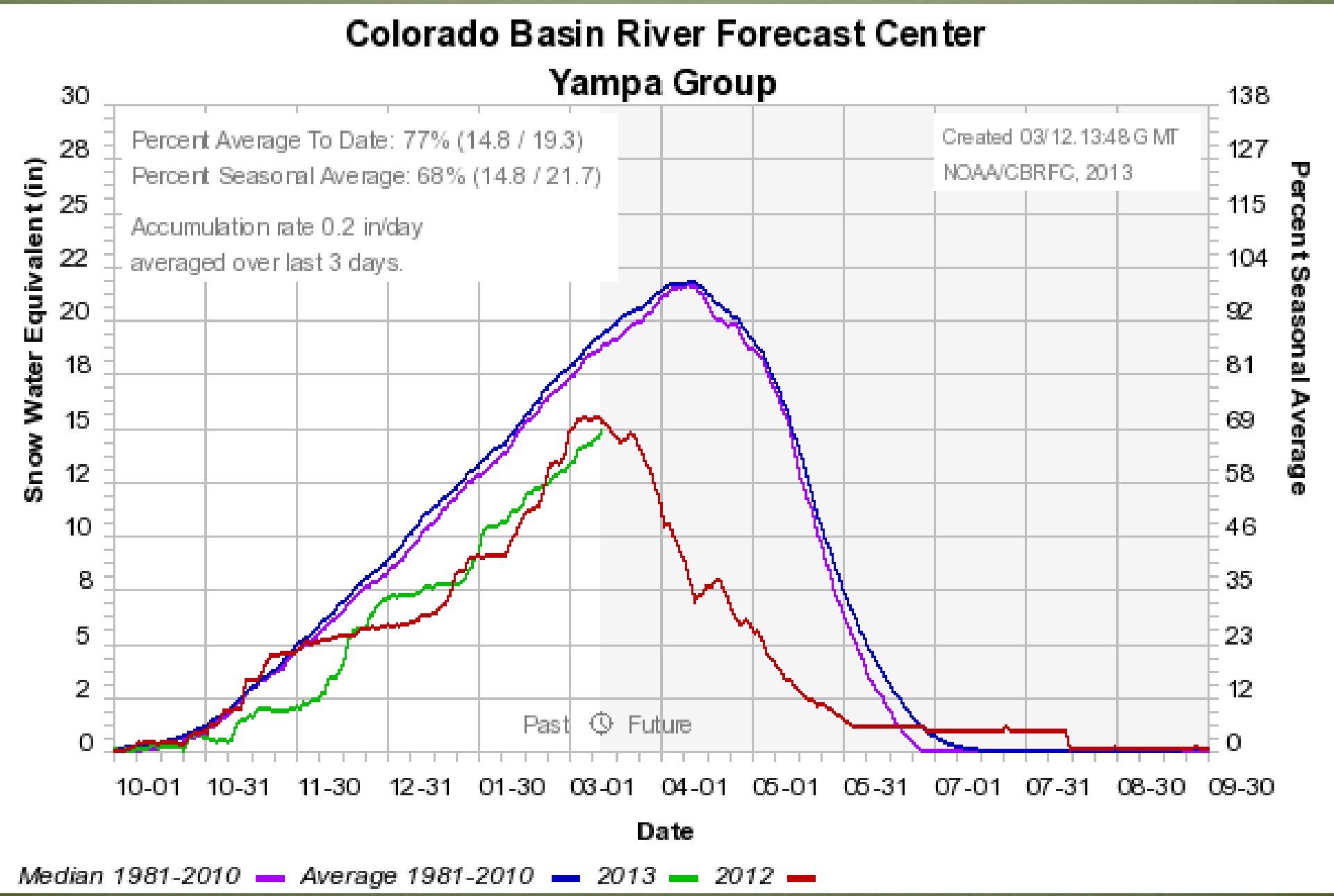


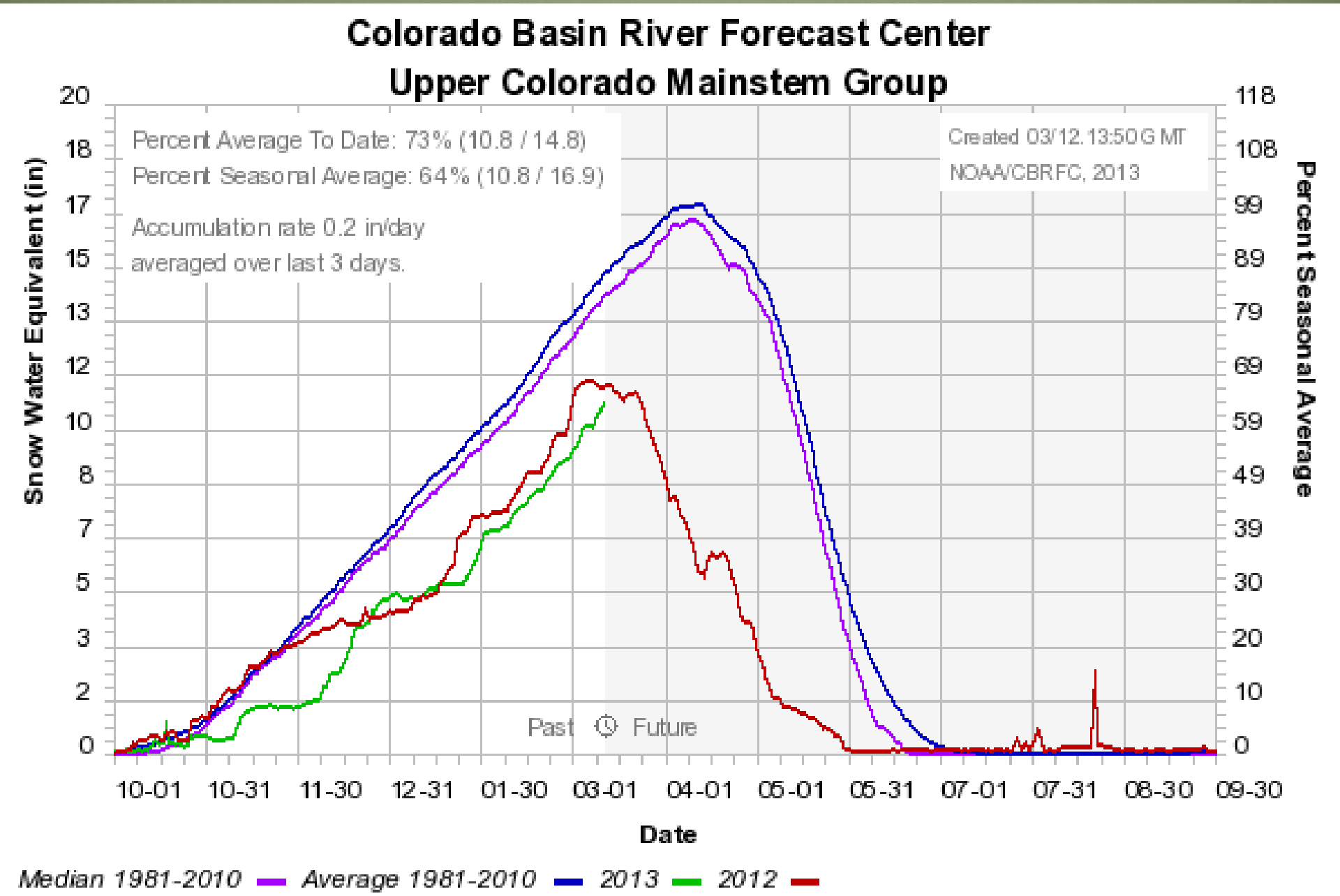

The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

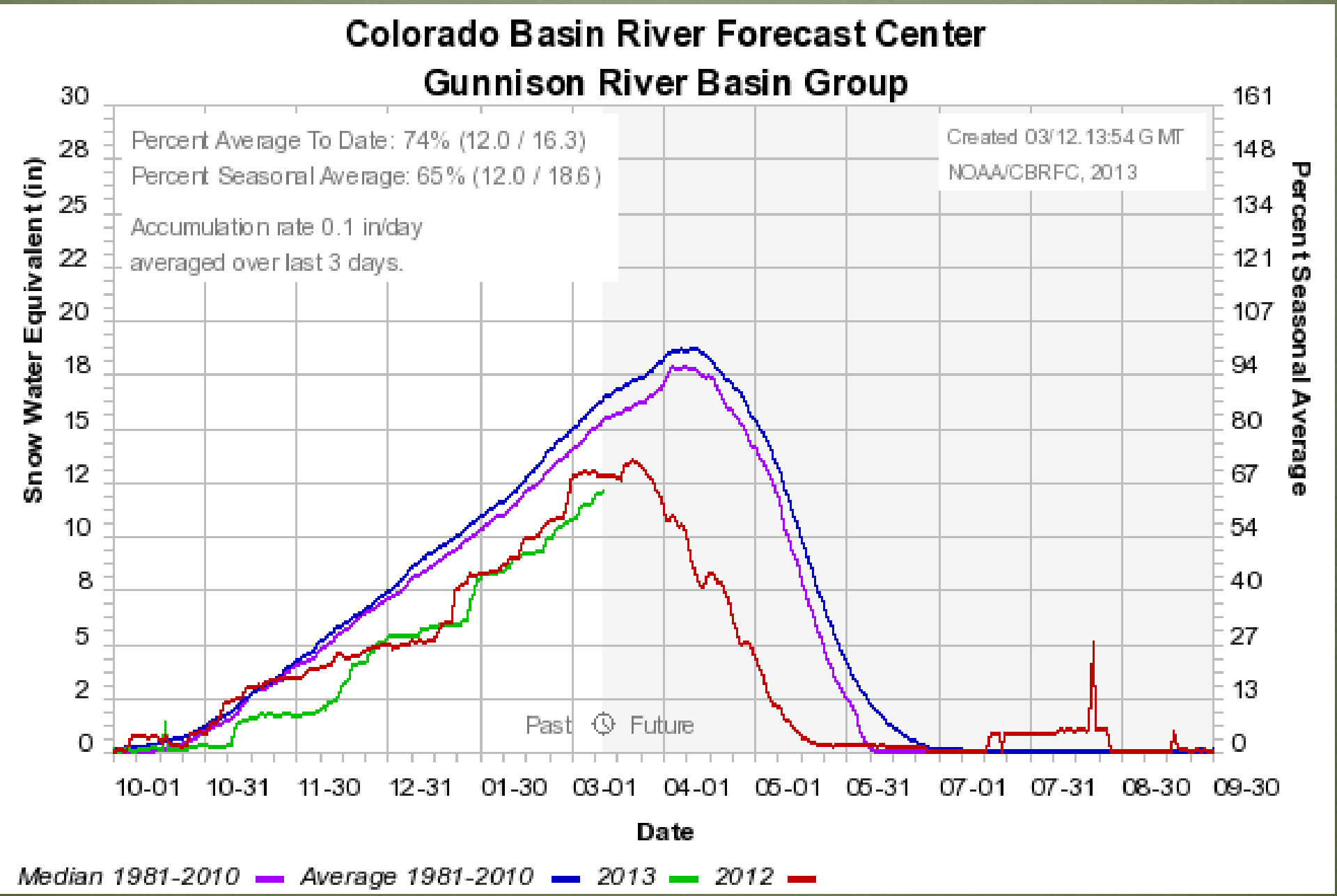
Prepared by the USDA/NRCS National Water and Climate Center
Portland, Oregon http://www.wcc.nrcs.usda.gov/gis/
Based on data from http://www.wcc.nrcs.usda.gov/reports/
Science contact: Jim.Marron@por.usda.gov 503 414 3047

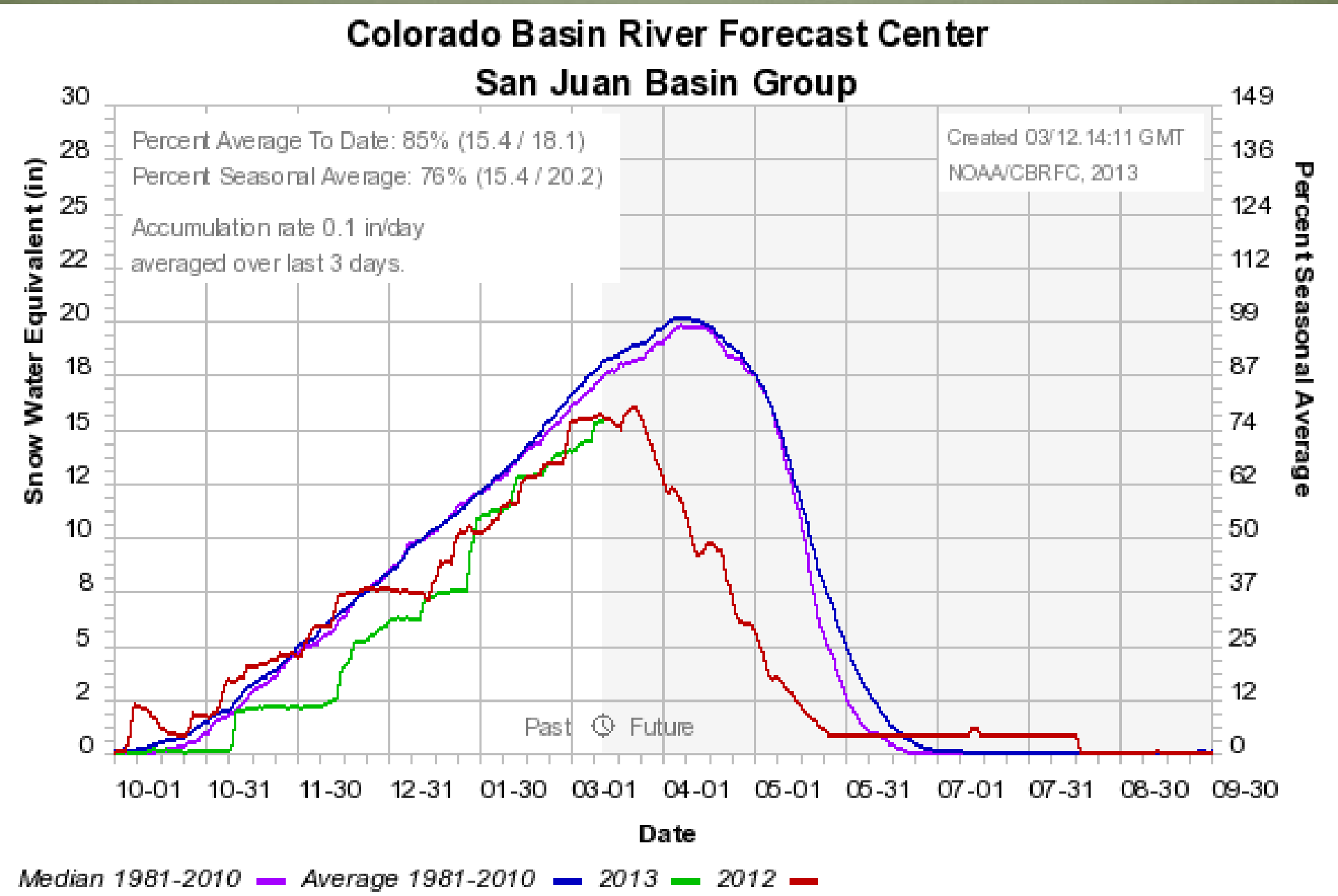

Colorado Basin River Forecast Center
Upper Green Group
Percent Average To Date: 78% (9.7 / 12.5)
Percent Seasonal Average: 68% (9.7 / 14.3)
Accumulation rate 0.1 in/day
averaged over last 3 days.
Created 03/12.13:45 GMT
NOAA/CBRFC, 2013
Snow Water Equivalent (in)
Percent Seasonal Average
20
18
17
15
13
12
10
8
7
5
3
2
0
140
128
117
105
93
82
70
58
47
35
23
12
0
Past
Future
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
05-31
07-01
07-31
08-30
09-30
Date
Median 1981-2010
Average 1981-2010
2013
2012


Colorado Basin River Forecast Center
Duchesne River Group
Percent Average To Date: 75% (9.7 / 12.9)
Percent Seasonal Average: 68% (9.7 / 14.3)
Accumulation rate 0.1 in/day
averaged over last 3 days.
Created 03/12.13:46 G MT
NOAA/CBRFC, 2013
Snow Water Equivalent (in)
Percent Seasonal Average
20
18
17
15
13
12
10
8
7
5
3
2
0
140
128
117
105
93
82
70
58
47
35
23
12
0
Past
Future
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
05-31
07-01
07-31
08-30
09-30
Date
Median 1981-2010
Average 1981-2010
2013
2012


Colorado Basin River Forecast Center
Yampa Group
Percent Average To Date: 77% (14.8 / 19.3)
Percent Seasonal Average: 68% (14.8 / 21.7)
Accumulation rate 0.2 in/day
averaged over last 3 days.
Created 03/12.13:48 G MT
NOAA/CBRFC, 2013
Snow Water Equivalent (in)
Percent Seasonal Average
30
28
25
22
20
18
15
12
10
8
5
2
0
138
127
115
104
92
81
69
58
46
35
23
12
0
Past
Future
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
05-31
07-01
07-31
08-30
09-30
Date
Median 1981-2010
Average 1981-2010
2013
2012


Colorado Basin River Forecast Center
Upper Colorado Mainstem Group
Percent Average To Date: 73% (10.8 / 14.8)
Percent Seasonal Average: 64% (10.8 / 16.9)
Accumulation rate 0.2 in/day
averaged over last 3 days.
Created 03/12.13:50 G MT
NOAA/CBRFC, 2013
Past
Future
Snow Water Equivalent (in)
Percent Seasonal Average
Date
20
18
17
15
13
12
10
8
7
5
3
2
0
118
108
99
89
79
69
59
49
39
30
20
10
0
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
05-31
07-01
07-31
08-30
09-30
Median 1981-2010
Average 1981-2010
2013
2012

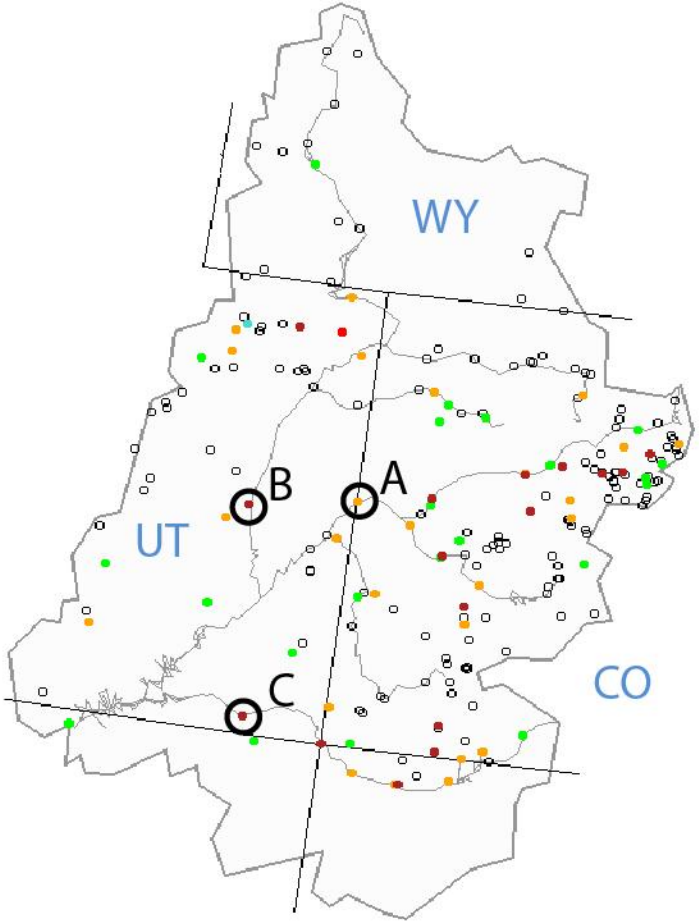

Colorado Basin River Forecast Center
Gunnison River Basin Group
Percent Average To Date: 74% (12.0 / 16.3)
Percent Seasonal Average: 65% (12.0 / 18.6)
Accumulation rate 0.1 in/day
averaged over last 3 days.
Created 03/12.13:54 GMT
NOAA/CBRFC, 2013
Snow Water Equivalent (in)
Percent Seasonal Average
30
28
25
22
20
18
15
12
10
8
5
2
0
161
148
134
121
107
94
80
67
54
40
27
13
0
Past
Future
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
05-31
07-01
07-31
08-30
09-30
Date
Median 1981-2010
Average 1981-2010
2013
2012


Colorado Basin River Forecast Center
San Juan Basin Group
Percent Average To Date: 85% (15.4 / 18.1)
Percent Seasonal Average: 76% (15.4 / 20.2)
Accumulation rate 0.1 in/day
averaged over last 3 days.
Created 03/12.14:11 GMT
NOAA/CBRFC, 2013
Snow Water Equivalent (in)
Percent Seasonal Average
30
28
25
22
20
18
15
12
10
8
5
2
0
149
136
124
112
99
87
74
62
50
37
25
12
0
Past
Future
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
05-31
07-01
07-31
08-30
09-30
Date
Median 1981-2010
Average 1981-2010
2013
2012

# Streamflow Update

Bob Kimbrough | U.S. Geological Survey

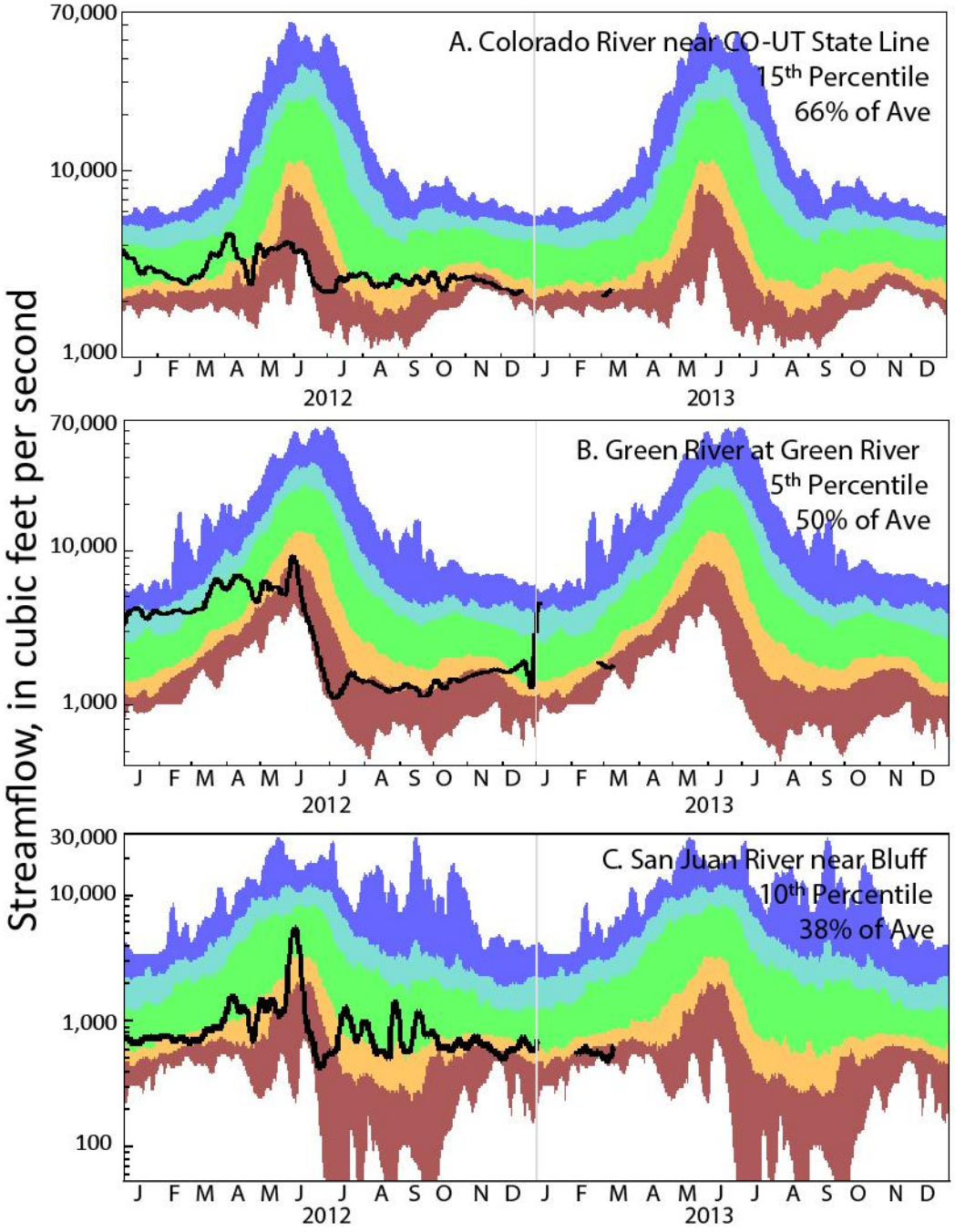
# 7 Day Average Streamflow
# Upper Colorado Basin
# March 10, 2013




USGS
science for a changing world

**Percentile classes**

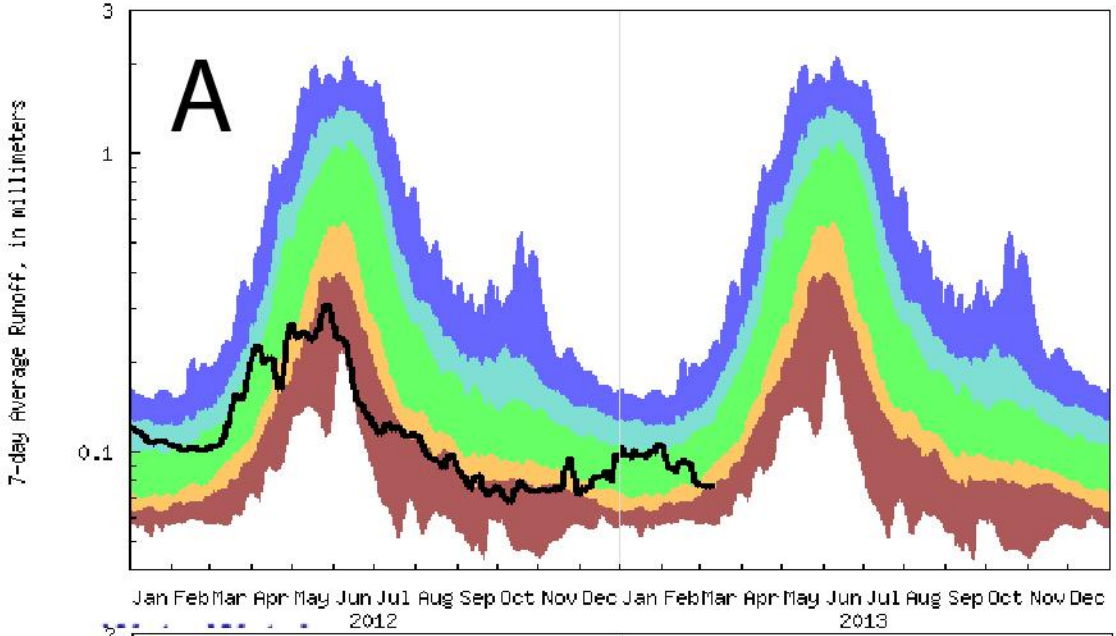
| < 10 | 10-24 | 25-75 | 76-90 | >90 |
|---|---|---|---|---|
| Much below normal | Below normal | Normal | Above normal | Much above normal |

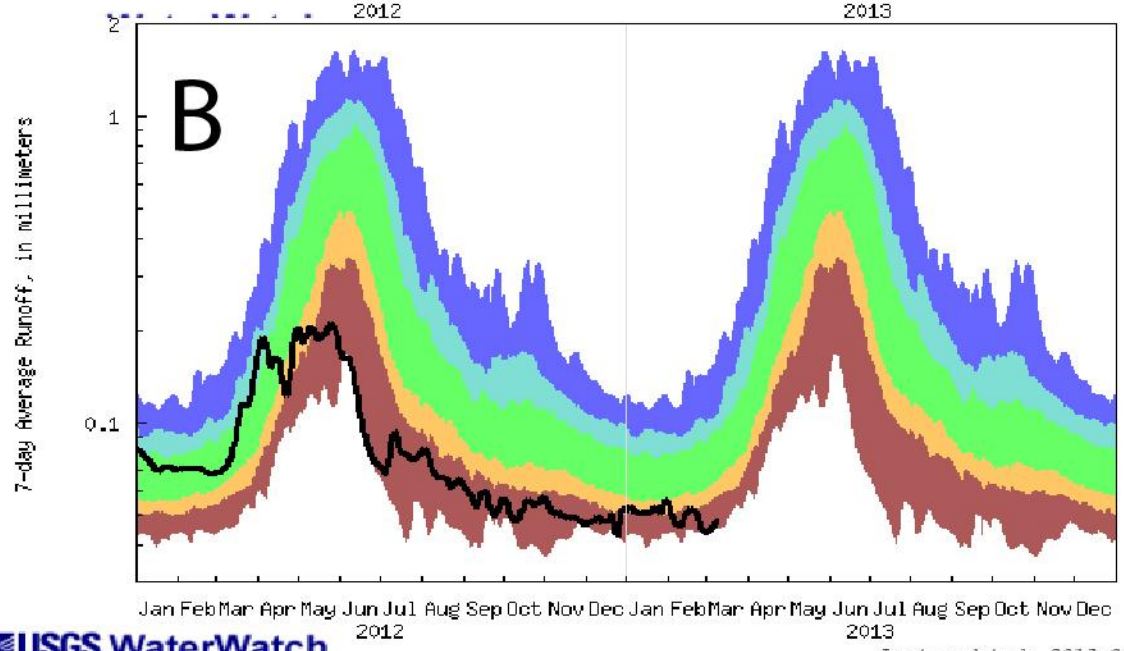


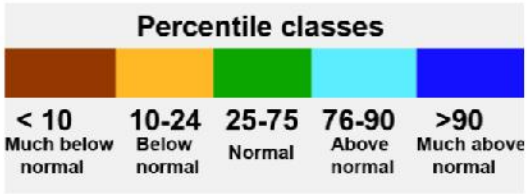
# 7 Day Average Runoff, March 11, 2013

A. All gages in the Upper Colorado Basin

B. All gages in the State of Colorado



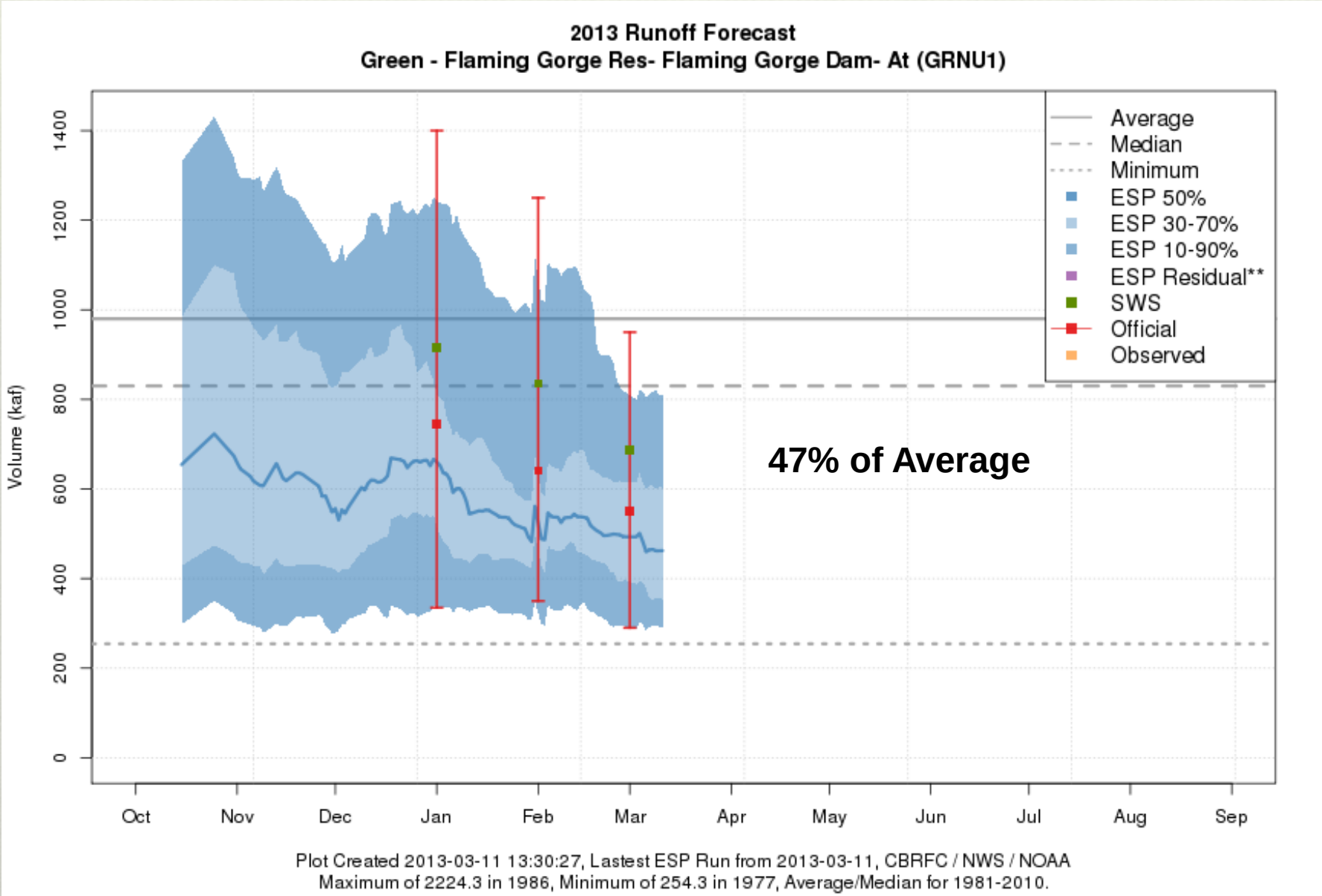




USGS WaterWatch

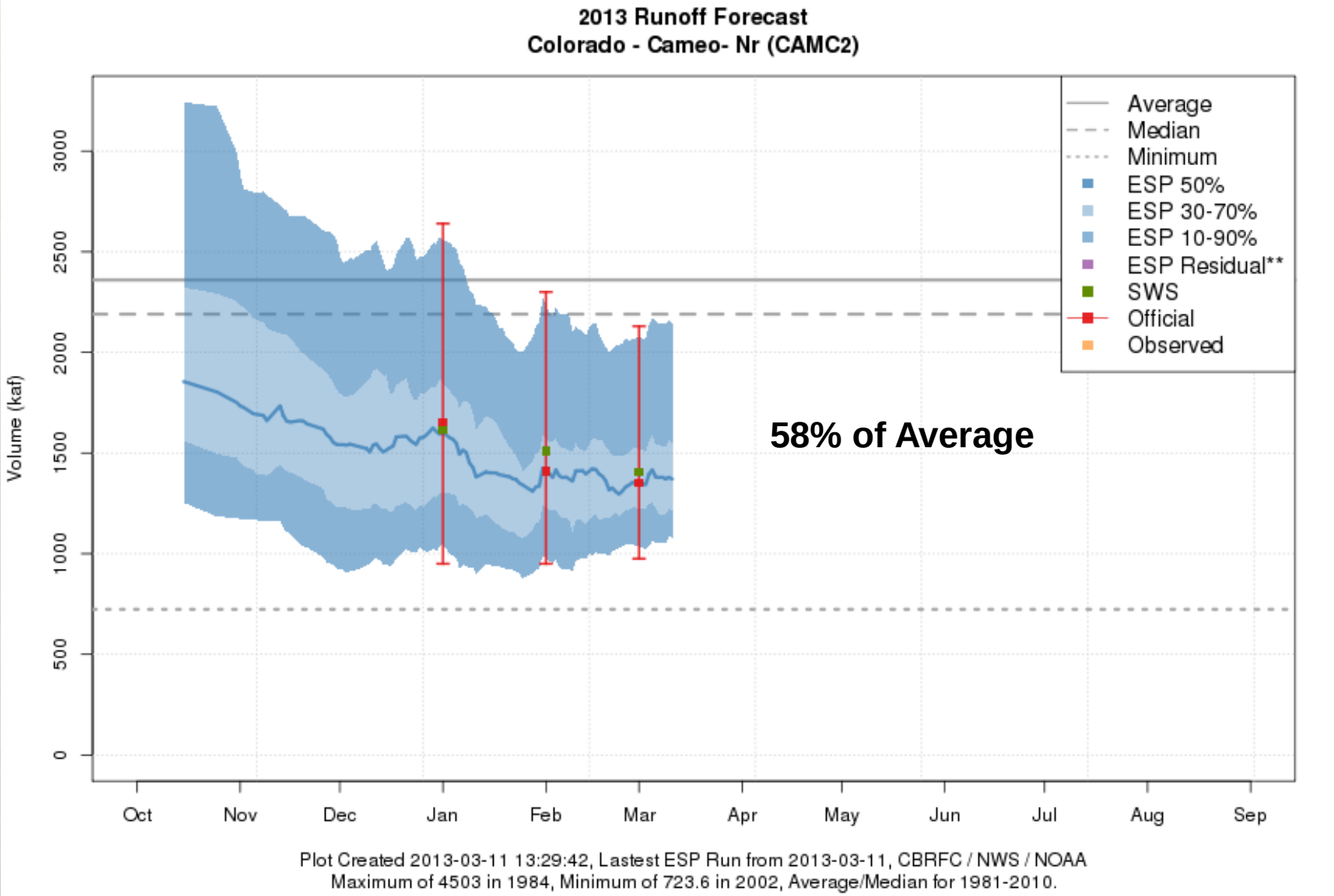
Last updated: 2013-03-11

# Streamflow Forecasts from CBRFC

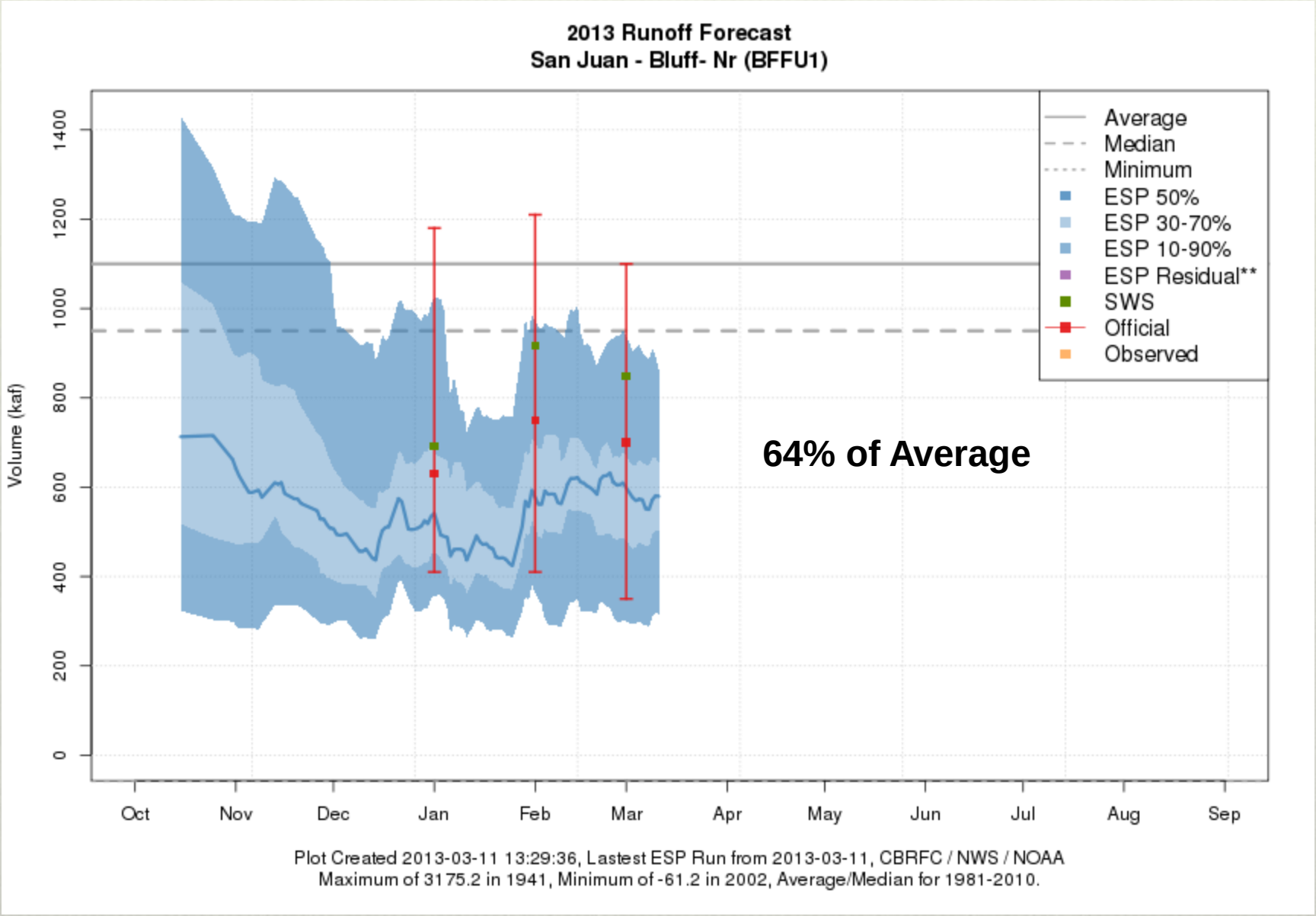
# Green River at Flaming Gorge Forecast



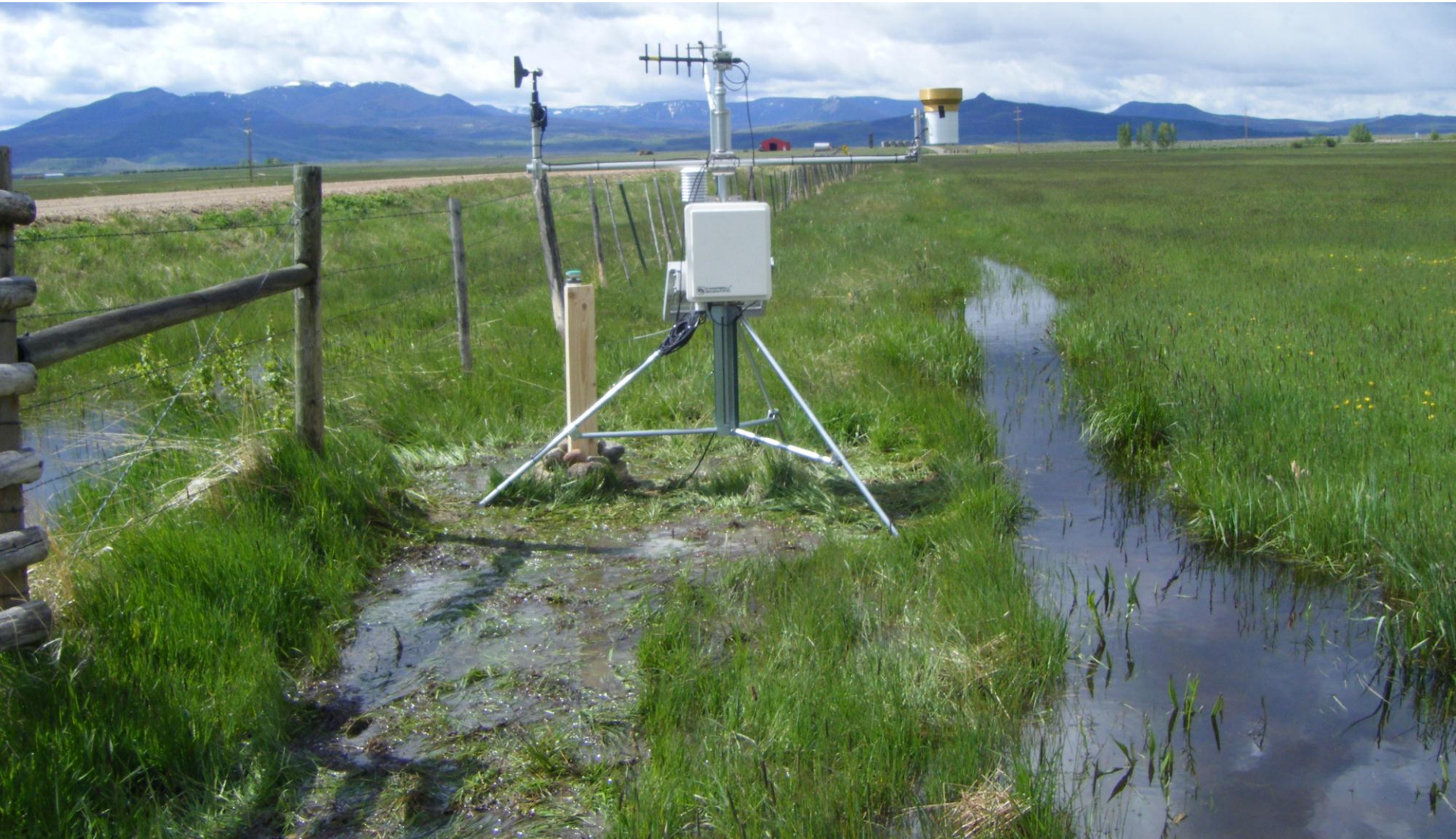
# Colorado River near Cameo



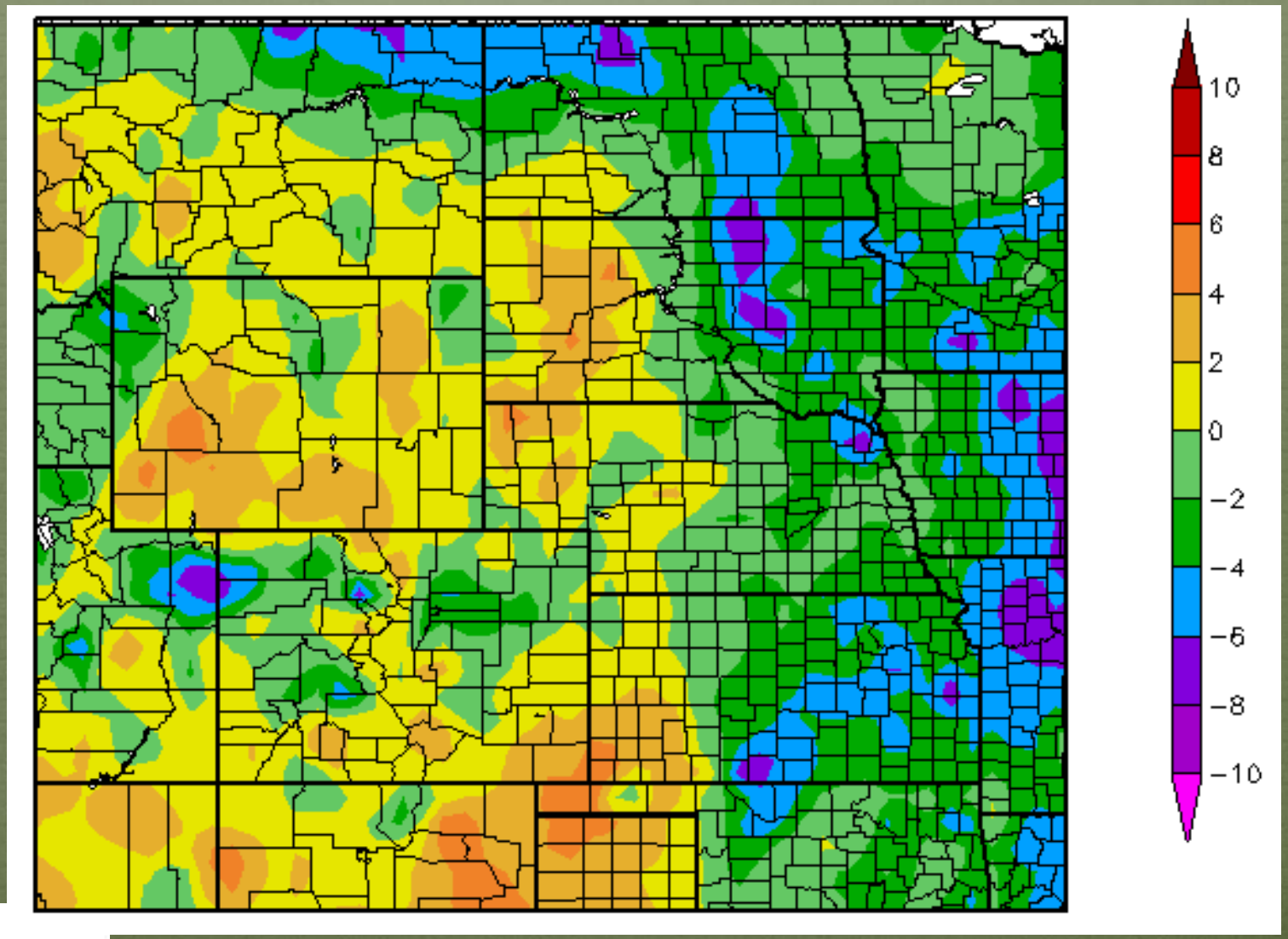
# San Juan River near Bluff



# Water Demand

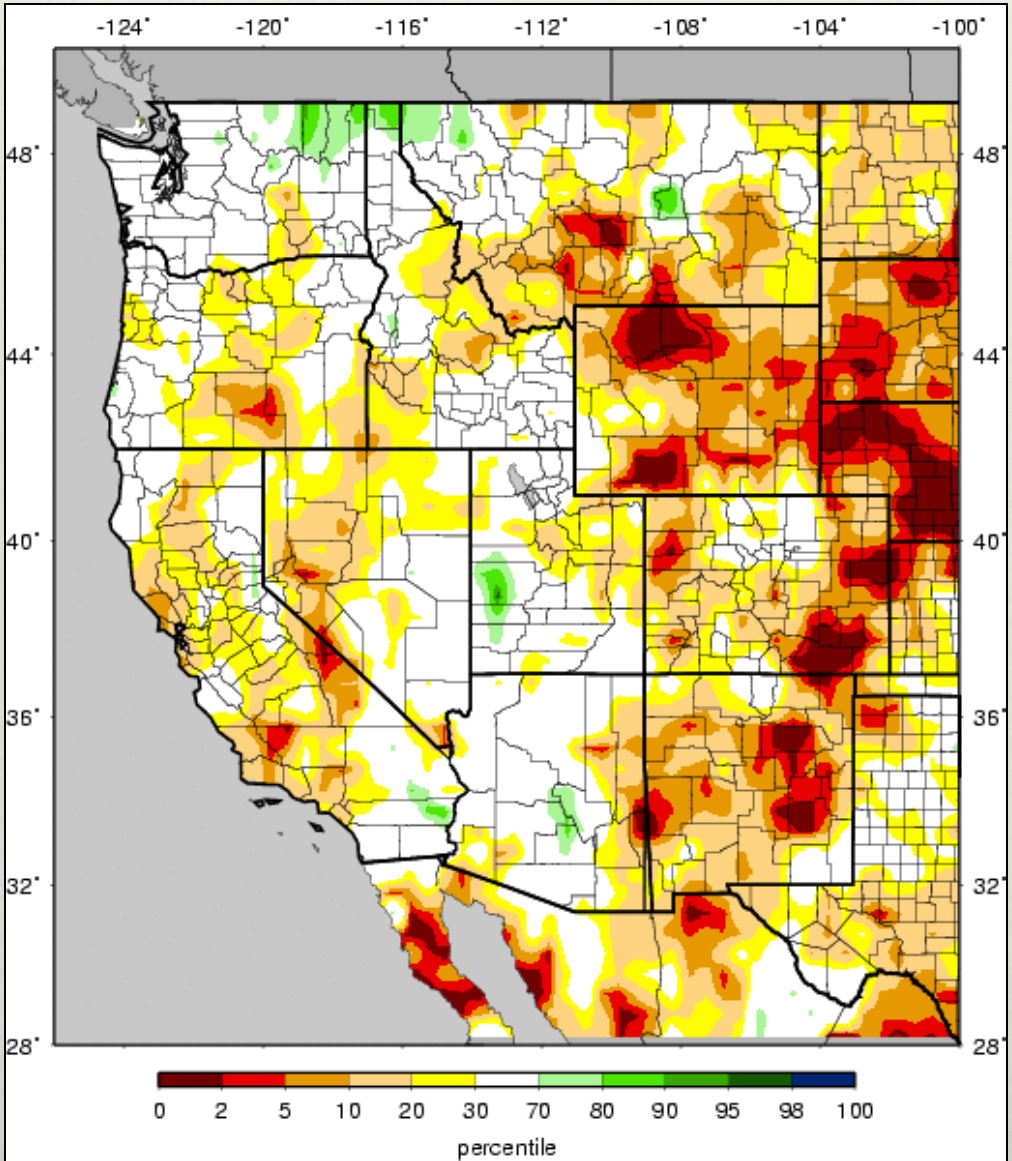


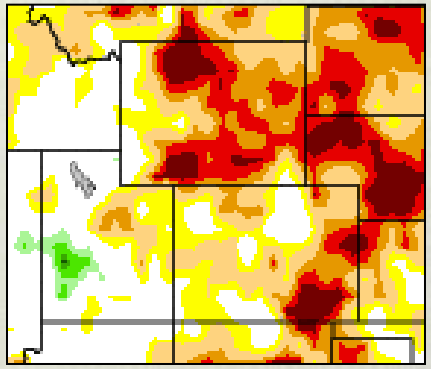
# Temperature Departure from Normal
# 03/01/2013 – 03/10/2013




High Plains Regional Climate Center

# VIC Soil Moisture
# 10 March 2013

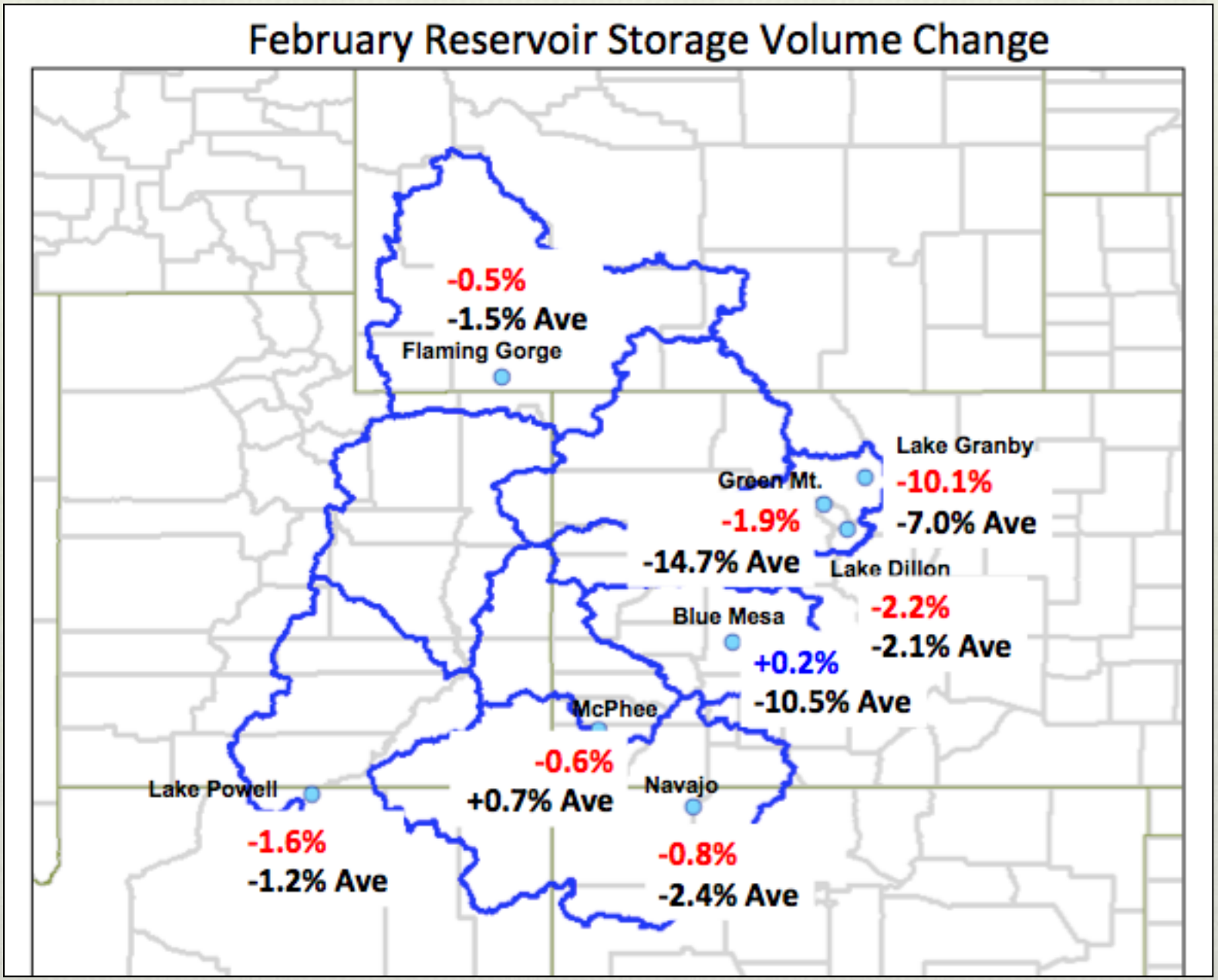


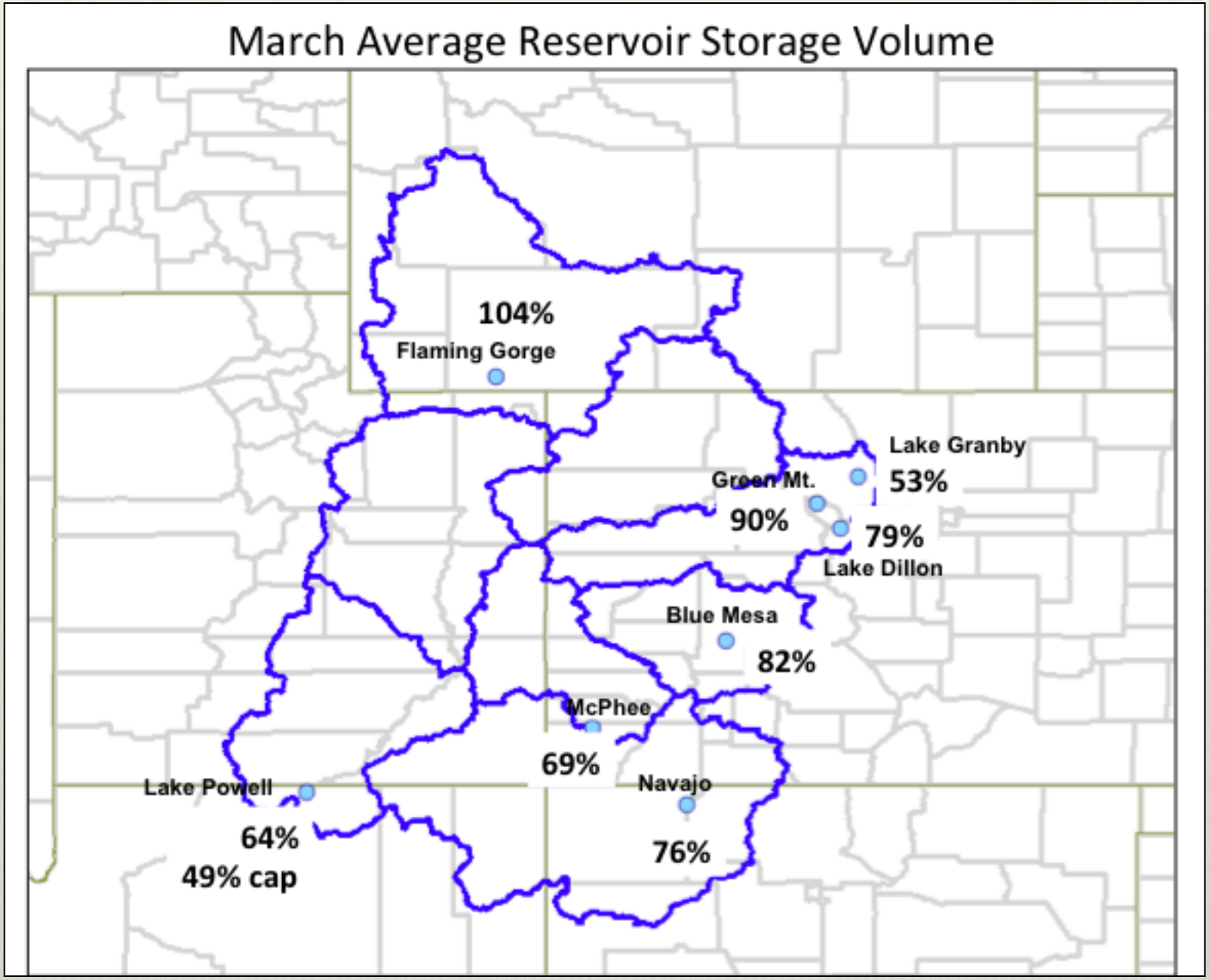
**VIC + SWE**

# Reservoir Update

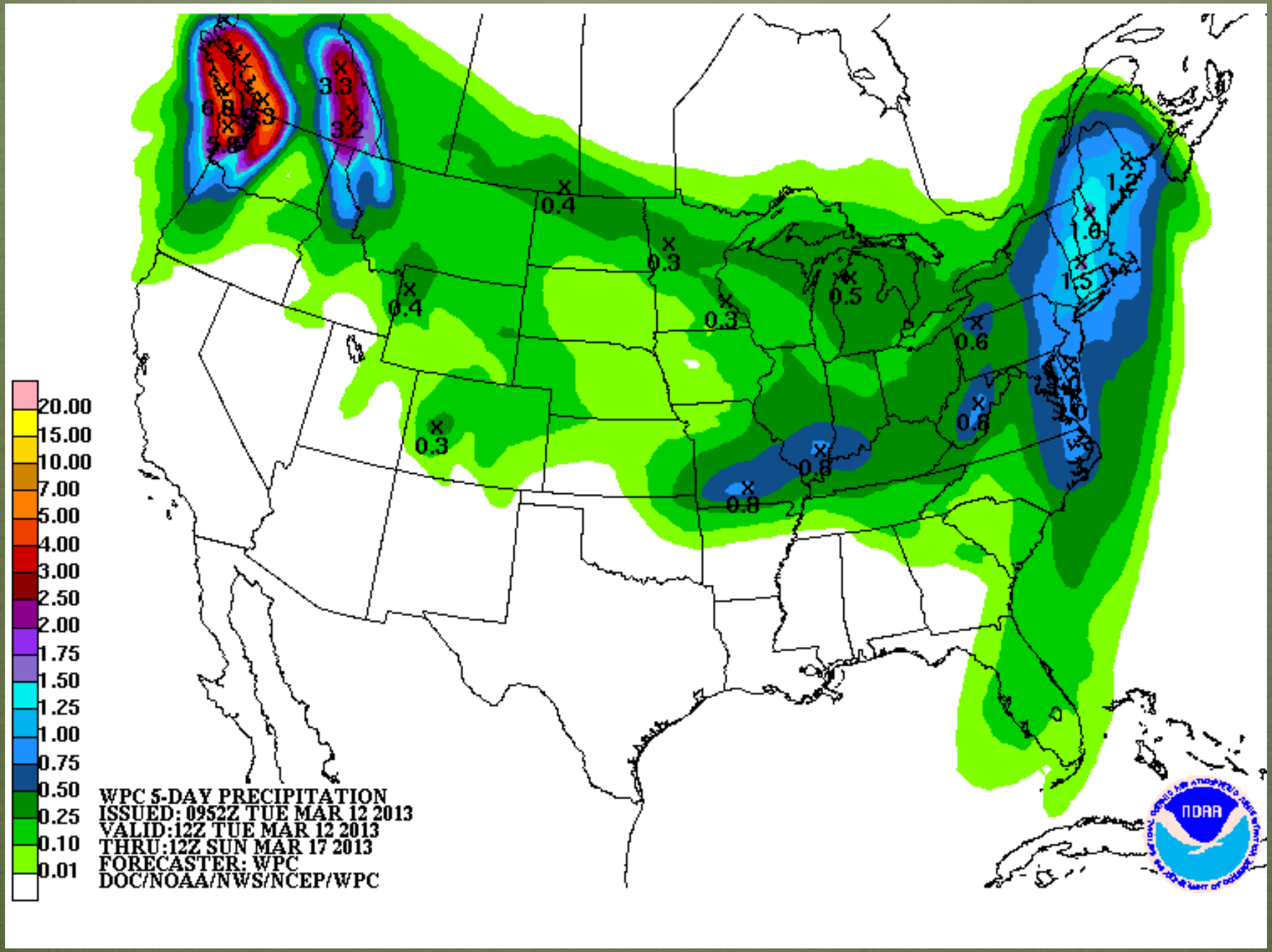
# February Reservoir Storage Volume Change



# March Average Reservoir Storage Volume

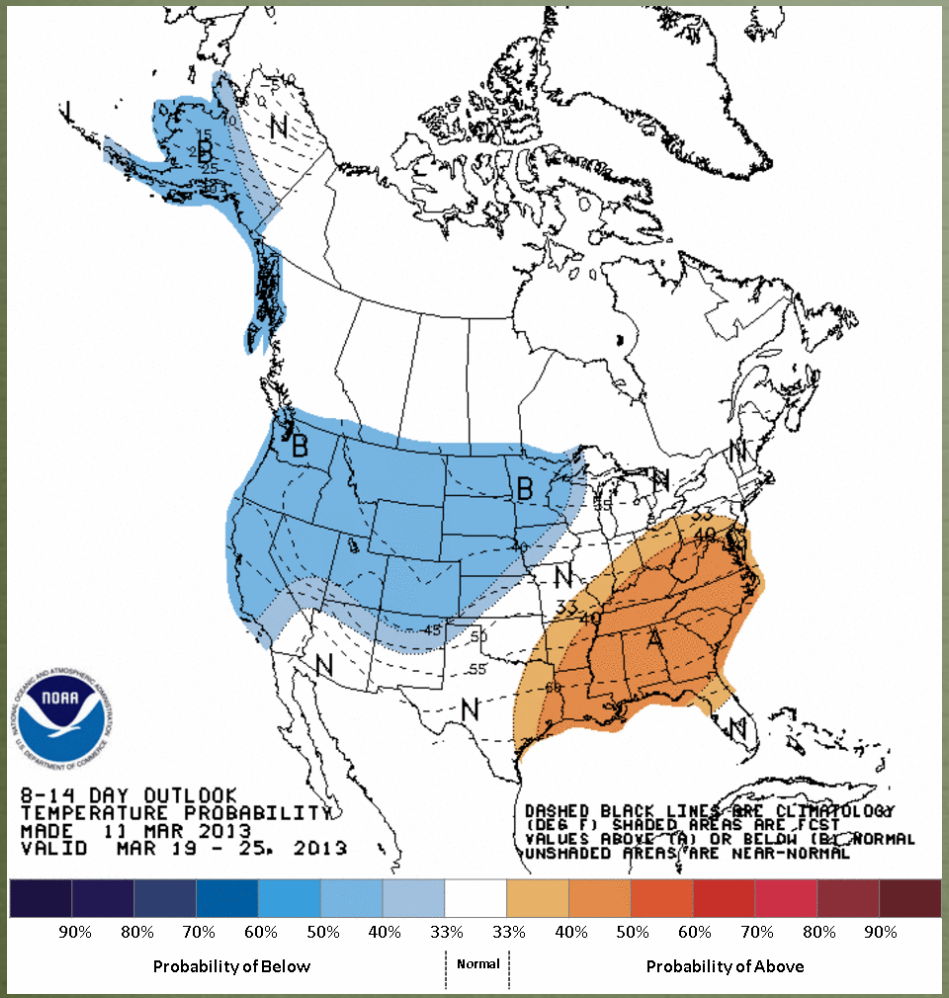


# Precipitation Forecast

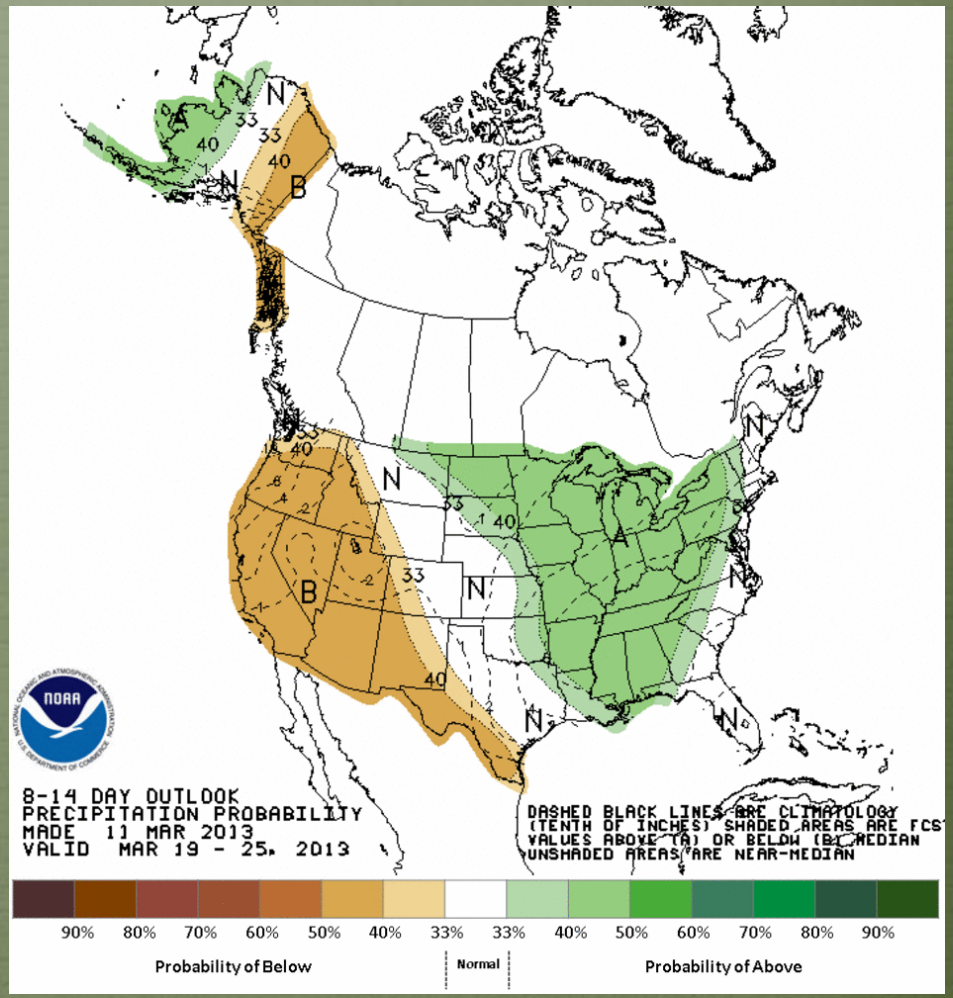



5-Day Quantitative Precipitation Forecast

# 8-14 Day Outlook

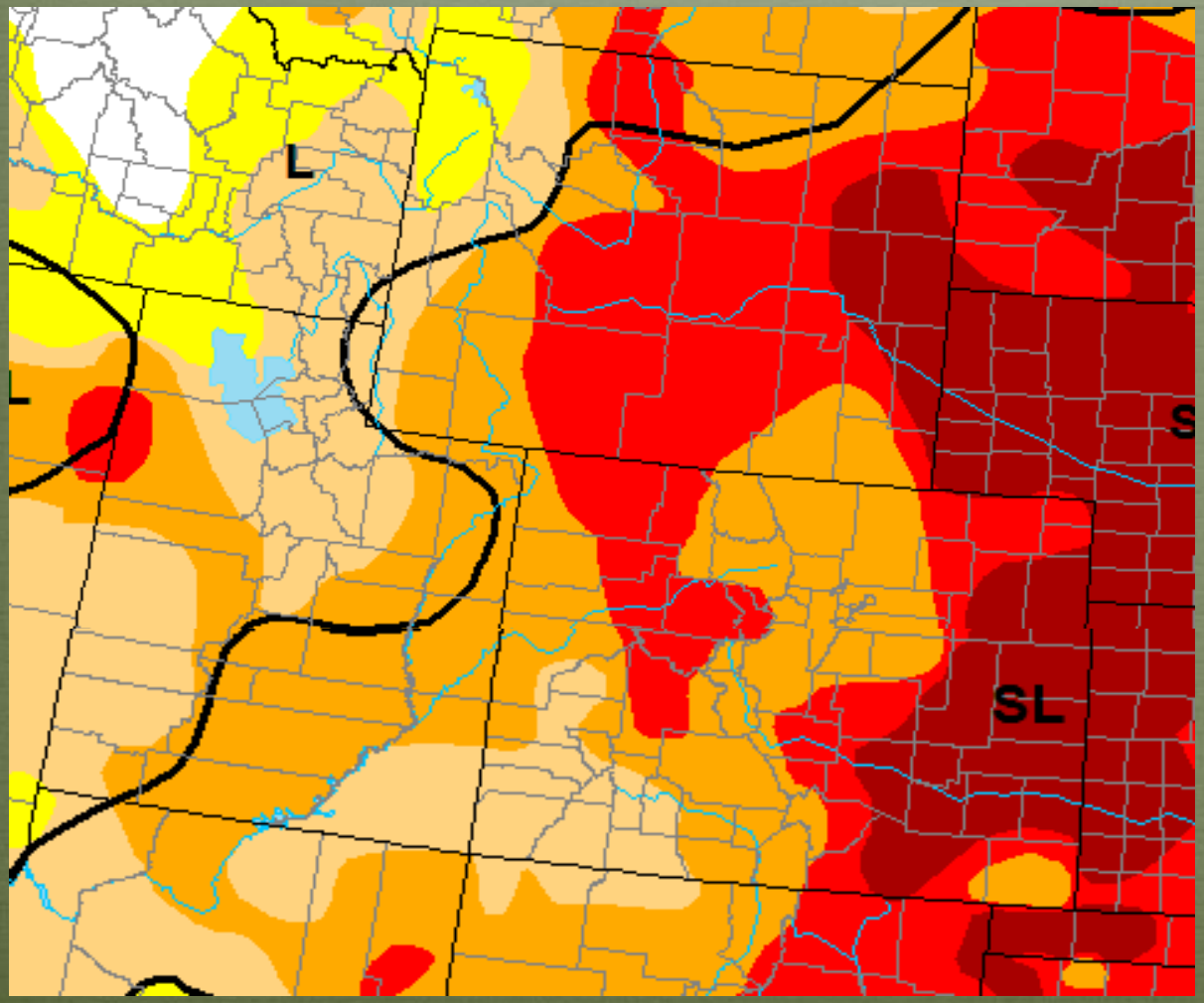



Temperature




Precipitation

# Recommendations




*Intensity:*

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

INFO


For more information

# NIDIS Weekly Climate, Water and Drought Assessment Summary

## Upper Colorado River Basin

## March 12, 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

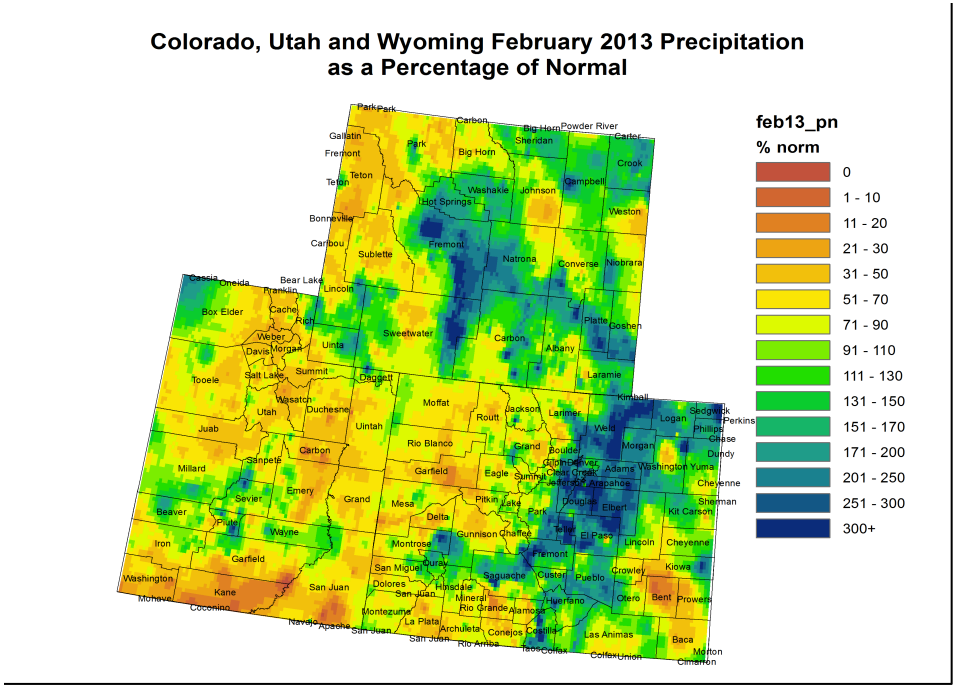



Fig. 1: February precipitation as a percent of average.

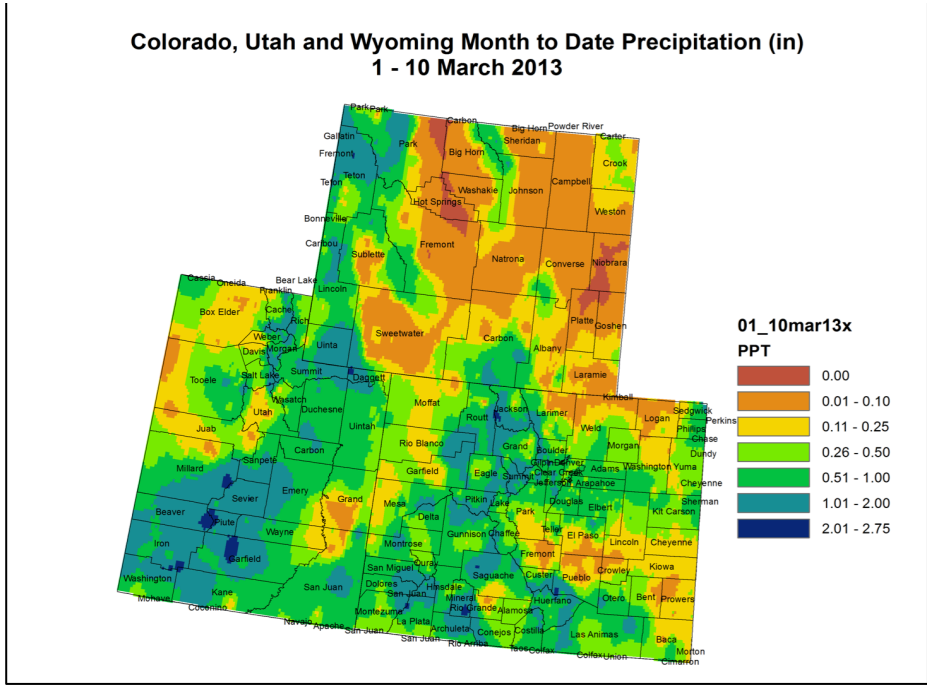



Fig. 2: March 1 – 10 precipitation in inches.

# Precipitation

Last month, most of the Upper Colorado River Basin (UCRB) received less than average precipitation (Fig. 1). Though the higher elevation precipitation amounts exceeded 1 inch in most areas, much of the UCRB received between 20% and 90% of average moisture for February. Parts of southwest Colorado (in the San Juans) and southwest WY received near to slightly above average precipitation for the month. Northern Utah was very dry (less than 50% of average) and the Colorado River valley just above Lake Powell was also very dry last month (mostly less than 30% of average). East of the basin, southeast CO remained drier than average, but northeast CO and the Front Range has seen some reprieve with much above average precipitation.

Since the beginning of the month, the majority of the UCRB has received more than .50 inches of moisture with many of the higher elevations receiving more than 1 inch and a few isolated areas seeing less than .25 inches (Fig. 2). East of the basin, much of southern CO, the Front Range, and parts of the eastern plains received .25 to over 1 inch of precipitation. Much of the Arkansas valley and northeast CO have received less than .25 inches.

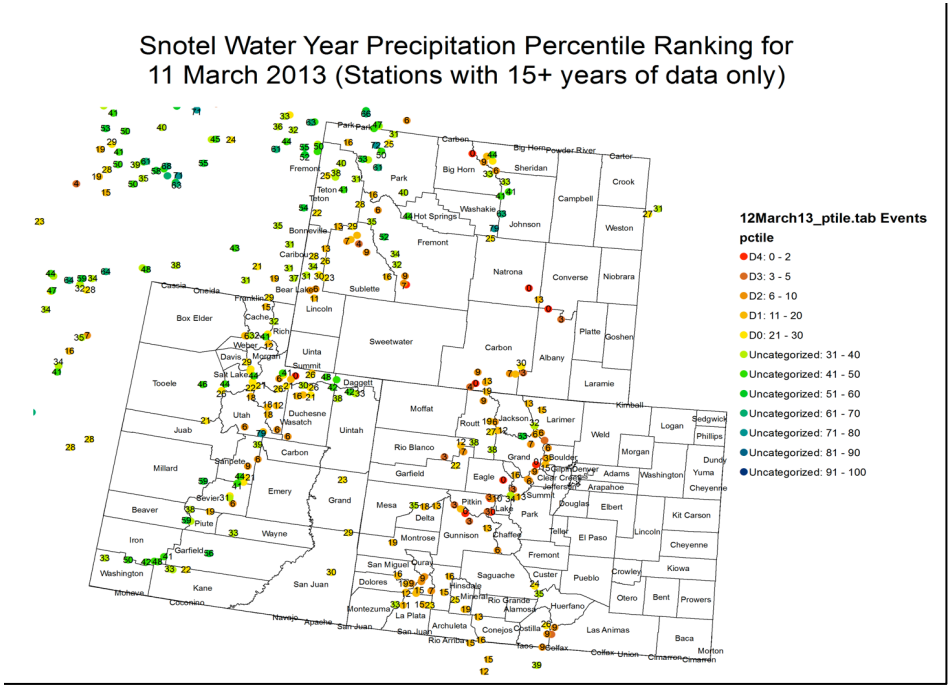



Fig. 3: WYTD SNOTEL precipitation percentiles (50th percentile is median, 30th percentile is D0 drought category) as of March 11th.

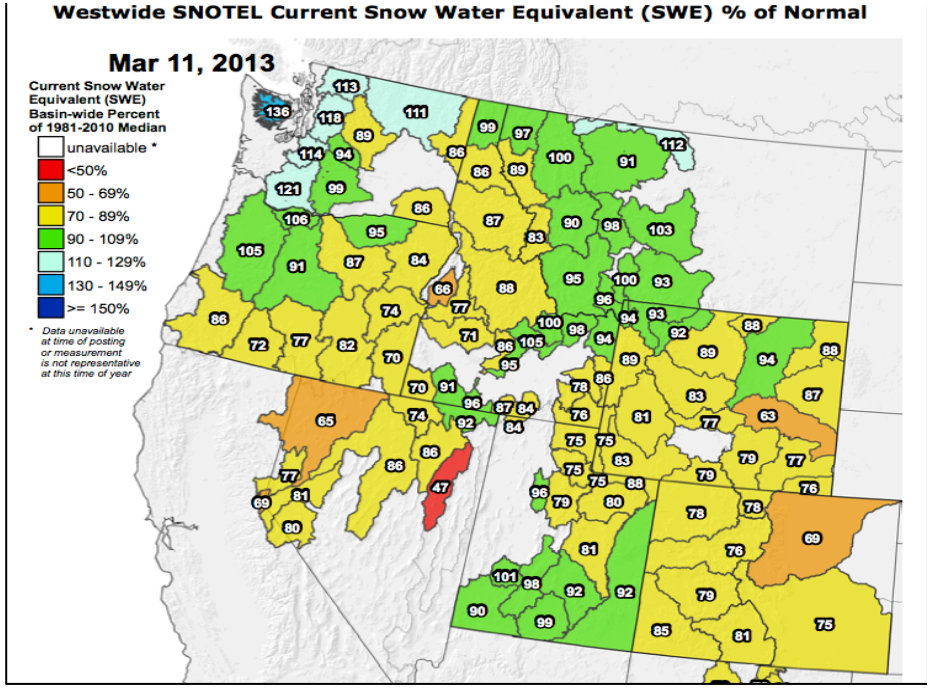



Fig. 4: Basin-averagd snow water equivalent as a percent of normal (median), as of March 11th.

# Snowpack

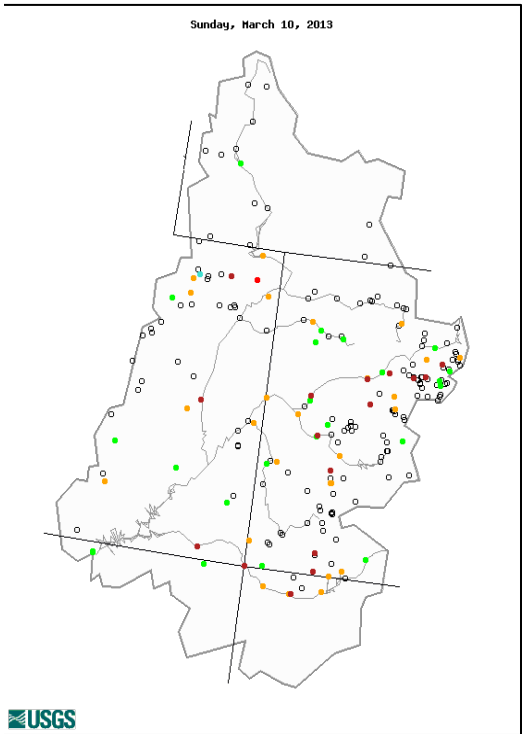
Water-year-to-date SNOTEL precipitation percentiles in the UCRB are below the median throughout the entire basin (Fig. 3). Along the Wasatch and Uintah ranges in UT and up to the Upper Green in WY, most percentiles range from the 20s to 40s, with a few that are now recording below the 10th percentile. 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.

Accumulated snowpack is currently less than normal across the entire UCRB (Fig. 4), though most of the sub-basins saw increases over the past week. Sub-basins in western CO range between 76% to 85% of normal snowpack. Southern UT basins are over 90% of normal while snowpack in the sub-basins of northern UT and southwest WY range between 75% and 88% of normal.

# Streamflow

As of March 10th, about 38% of the USGS streamgages in the UCRB recorded normal (25th – 75th percentile) to above normal 7-day average streamflows (Fig. 5). About 26% percent of the gages in the basin are recording much below normal or low (i.e. lowest on record) streamflows, a decrease of 14% over the past week. This increase in flows is partly due to increased runoff from recent storms and warmer temperatures. Almost half of the gages are now out of ice-affected conditions.

All three key gages in the basin have come out of frozen conditions (Fig. 6). Flows on the Colorado River near the CO-UT state line had been ice affected since late December but began reporting again last week and is now reporting below normal flows at the 15th percentile. The Green River at Green River, UT site has been recording for a couple weeks now and is reporting much below normal flows at the 5th percentile. The San Juan River near Bluff, UT saw a slight increase in flows last week, but is still recording flows in the much below normal range (up from the 3rd percentile to the 9th percentile).



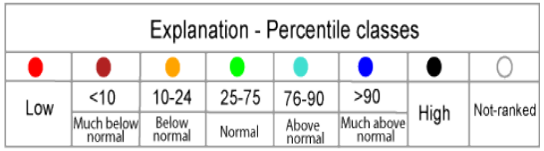




Fig. 5: 7-day average discharge compared to historical discharge for March 10th.

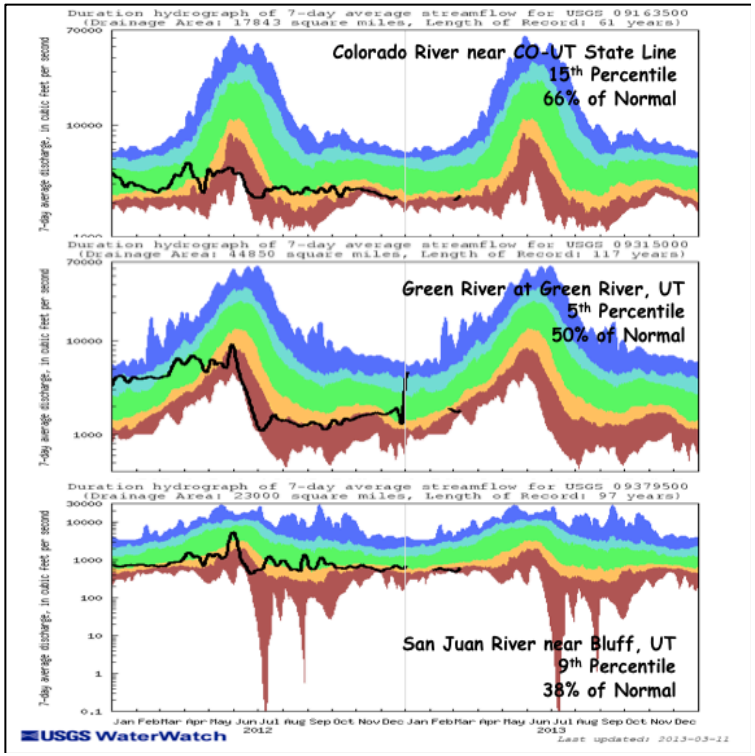



Fig. 6: USGS 7-day average discharge over time at the CO-UT stateline (top), Green River, UT (middle) and Bluff, UT (bottom).

# Water Supply and Demand

Last week, most of the UCRB experienced near normal temperatures (plus or minus 2 degrees) with slightly cooler than average temperatures mostly over northeast UT and northwest CO and warmer temperatures around the northern fringes of the basin. Cooler than average temperatures were seen over most of northeast CO with warmer than average temperatures in southern and southeast CO. The VIC soil moisture model continues to show dry soils through most of WY with near normal soil moisture in far southwest WY (Fig. 7). Soil dryness is below the 20$^{th}$ percentile for most of western CO, but is much improved when including SWE (Fig. 7). Dry soils below the 10$^{th}$ percentile show up over most of southern and eastern CO.

Last month, most of the major reservoirs in the UCRB saw slight decreases in volume, which is normal for this time of year. Blue Mesa has stayed near steady for most of the calendar year though it usually decreases this time of year. McPhee decreased in volume, though it normally increases slightly in February. Lake Granby saw large volume decreases last month. Flaming Gorge is the only major reservoir near its March average, while the rest of the reservoirs range between 53% (Lake Granby) and 90% (Green Mountain) of average.

# Precipitation Forecast

A weak disturbance will make its way out of the UCRB on Tuesday evening and give way to a ridge of high pressure for the remainder of the work week. Temperatures will gradually climb above average under this pattern with little in the way of precipitation expected anywhere in the basin through Friday. The next weak disturbance will begin to affect the northern mountains on Saturday, which will be closely followed by a stronger system on Sunday. Precipitation amounts with these features will generally be on the light side, with liquid accumulations of 0.10 across western CO/northeast UT and isolated amounts of 0.25-0.50 along the Continental Divide of CO through Sunday (Fig. 8). Forecast confidence decreases sharply after Sunday, with most forecast models dissagreeing on the timing and placement of individual weather systems. Expect slightly unsettled conditions to be possible moving into early next week with only marginal chances of significant precipitation for the basin.

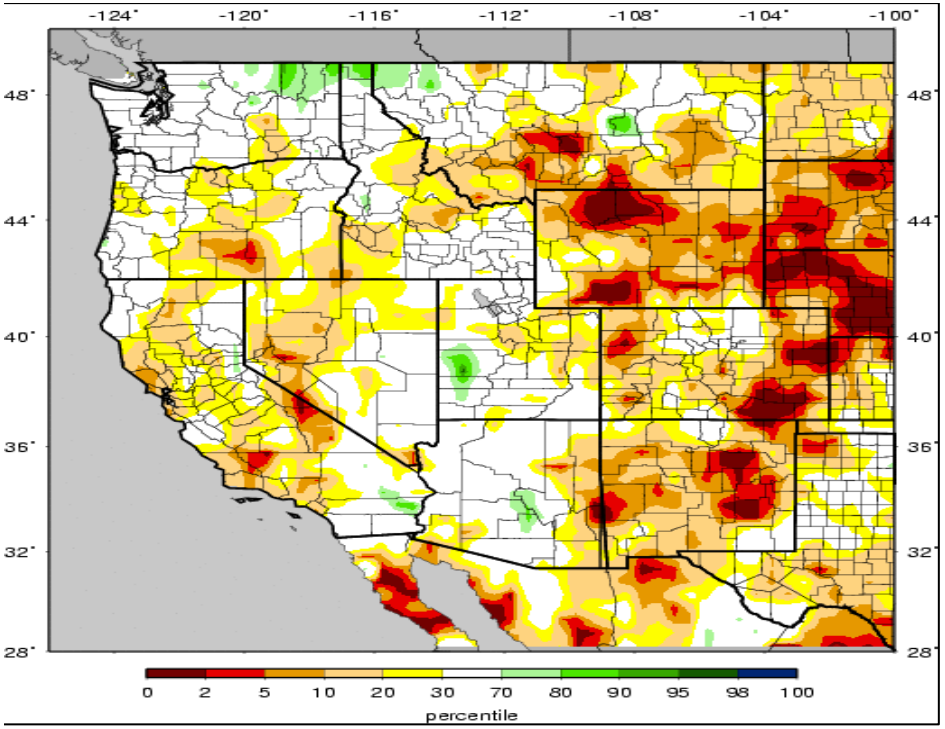



Fig. 7: VIC modeled soil moisture percentiles for the western U.S. as of March 10th. The map below combines soil moisture and SWE.

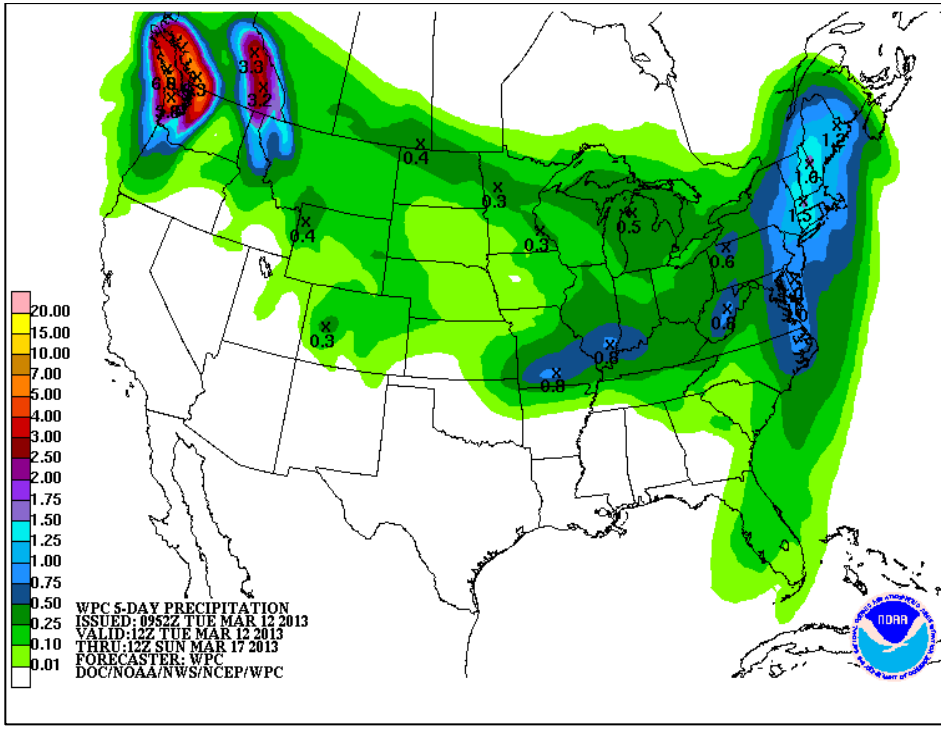
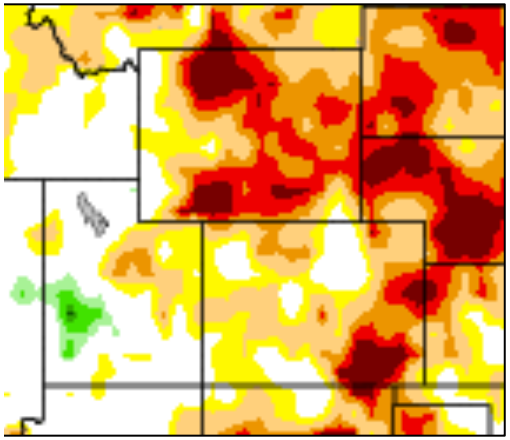
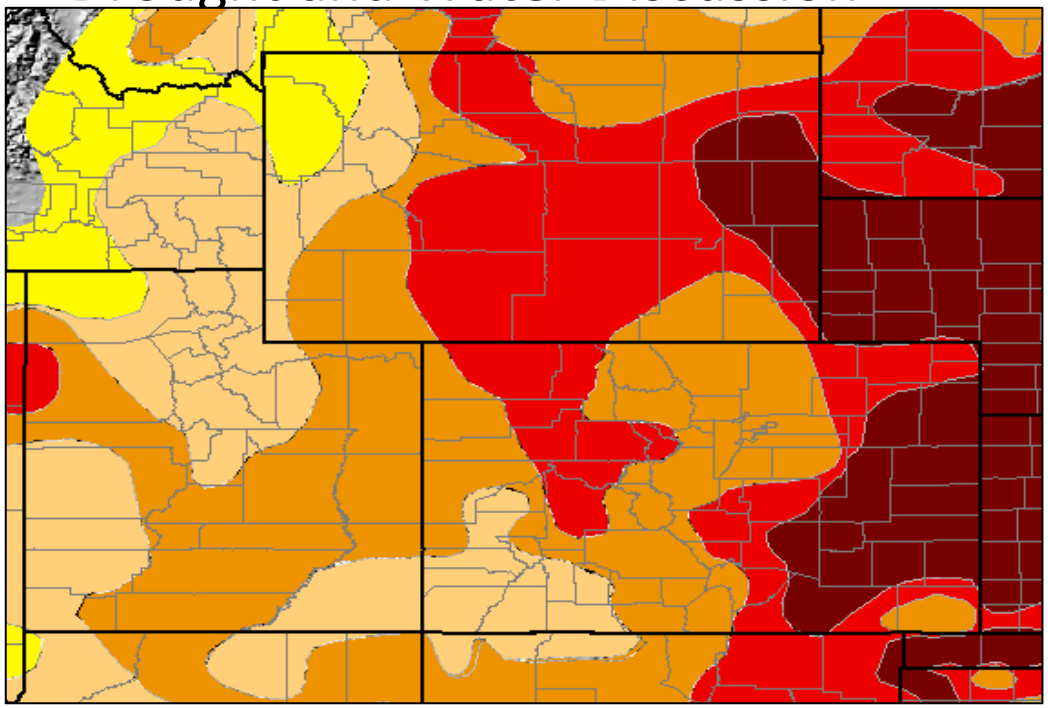
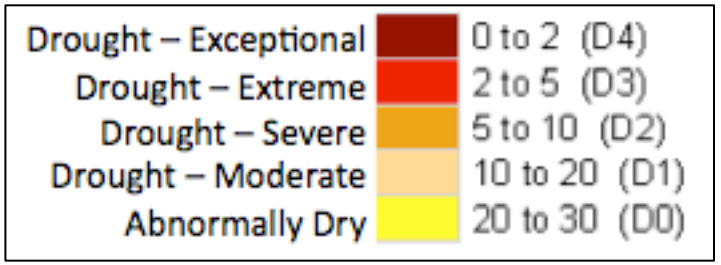



Fig. 8: Quantitative precipitation forecast (QPF) by the Hydrologic Prediction Center out to 12UTC Sunday.



# Drought and Water Discussion






Drought categories and
their associated percentiles

Fig. 9: March 4th release of U.S. Drought Monitor for the UCRB.

**UCRB:** Status quo is recommended for the UCRB in the current depiction of the U.S. Drought Monitor (USDM) map (Fig. 9).

**Eastern CO**: Status quo is also recommended for the rest of CO. Slight improvements could possibly be justified along the Front Range urban corridor and adjacent foothills and along the Wet Mountains around Custer and Huerfano counties in southern CO. However, the consensus is to hold off on any improvements as long-term impacts are still apparent, water restrictions are going into effect in many of these areas, and drier and warmer weather is forecast for the region. Several more beneficial storm events are needed for real improvement to be justified.