# Colorado Basin
# Water Supply Briefing

March 7 2018

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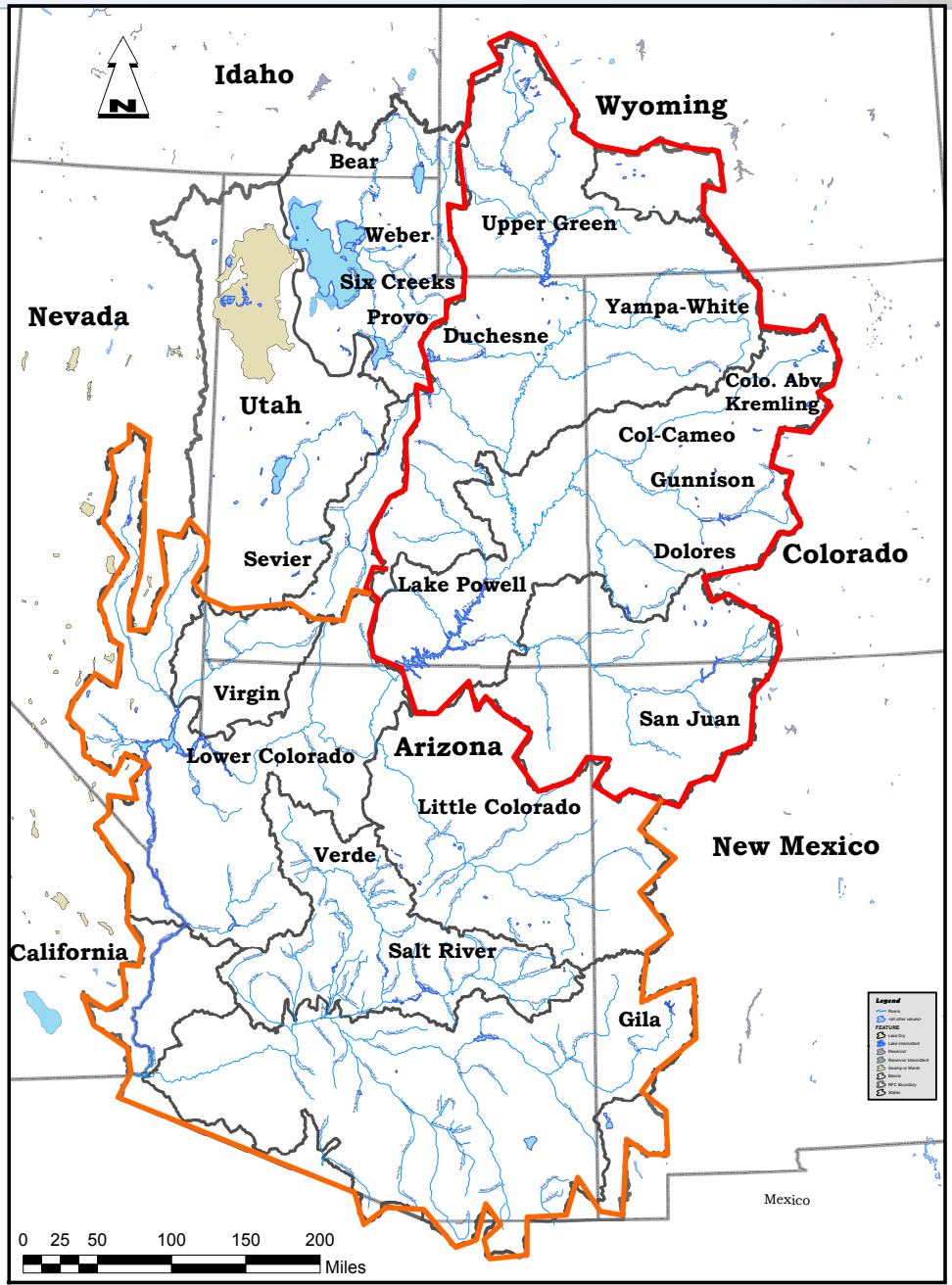
**Phone: 1-877-929-0660**

**Passcode: 1706374**

**Please mute your phone until the question period**

## CBRFC Forecast Areas



# Today's Presentation

**February Weather – Pattern change mid month- more active weather**

**Current Snowpack Conditions-Still dismal in most areas**

**2018 Water Supply Forecasts – March update**

**Select Forecast Site Review – Where are forecasts trending?**

**March Forecast Error – Much improvement over February?**

**Upcoming Weather – Any chance to improve the situation?**

**Takeaways – Low runoff likely many areas – climatologically running out of time**

**Contacts & Questions**

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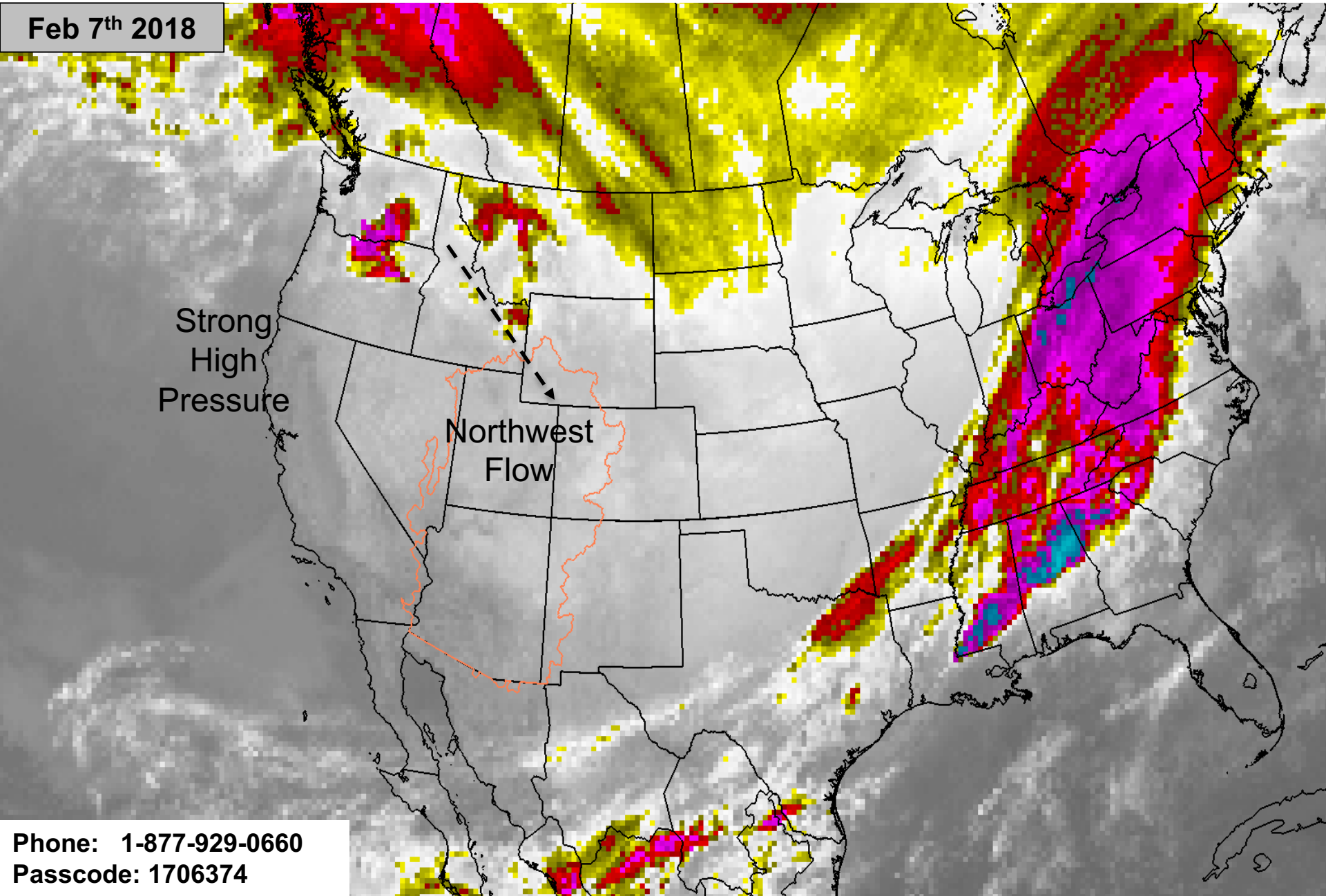
# February Weather: Started the month dominated by high pressure ridge

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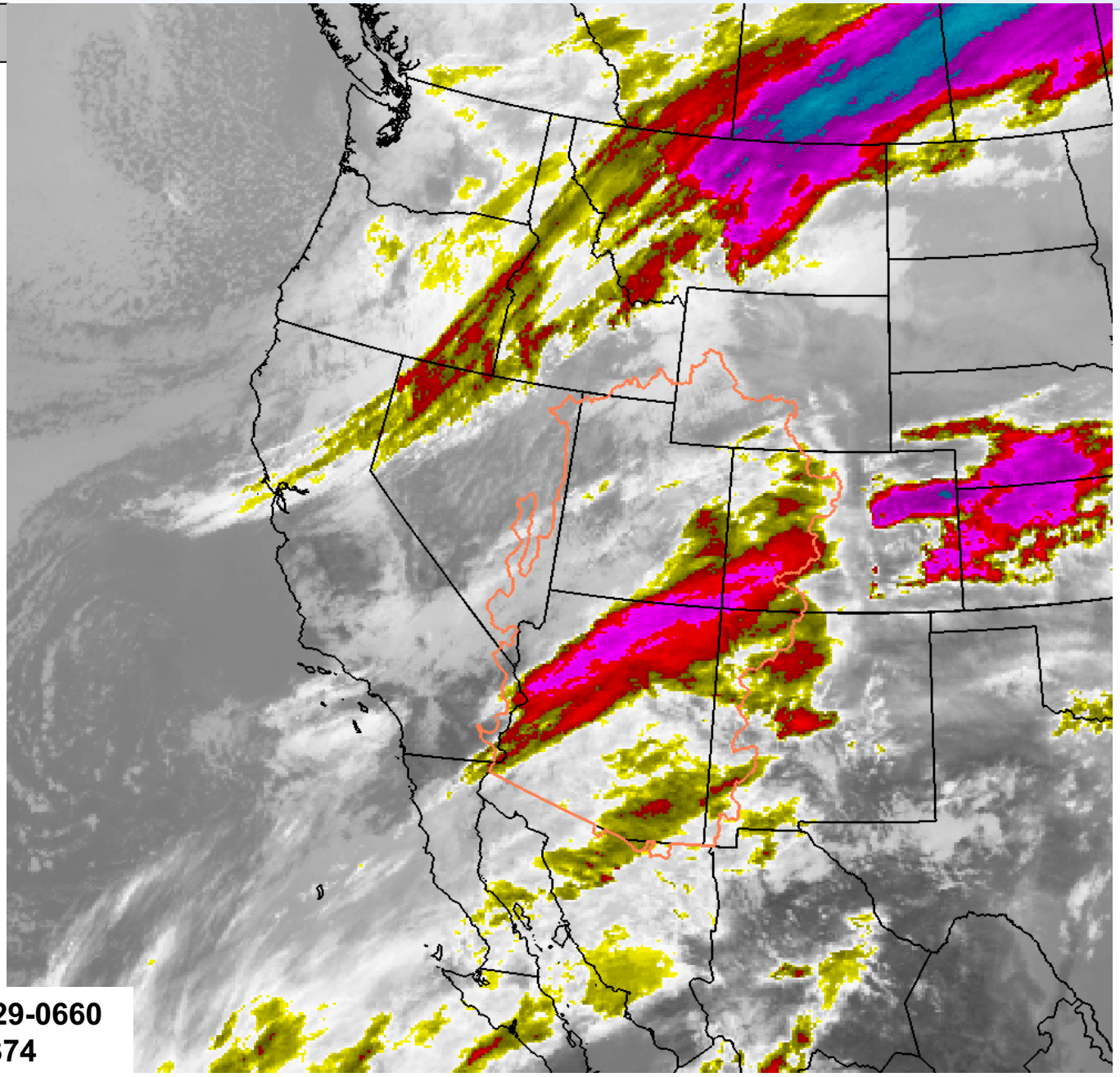
February Weather: Mid month pattern change as a trough of low pressure developed. This opened the door to more active weather with an increase in storms / precipitation.

**Feb 14th 2018**



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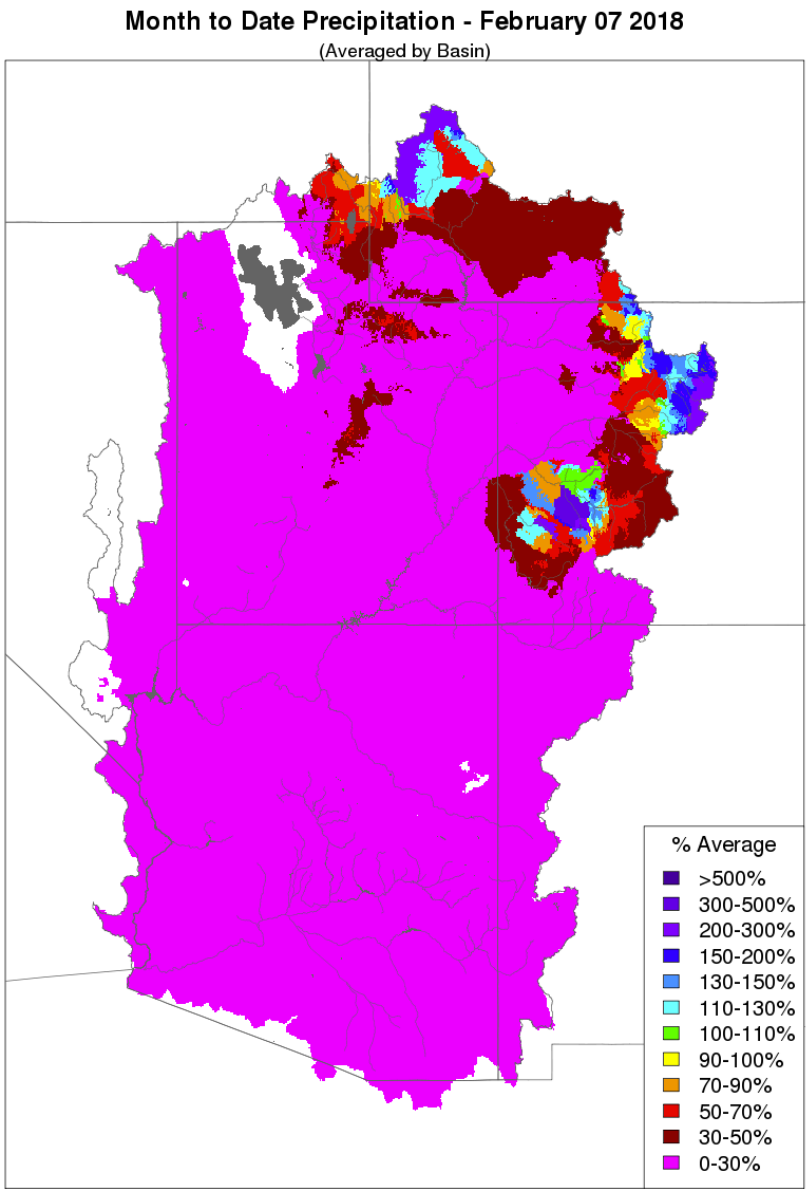
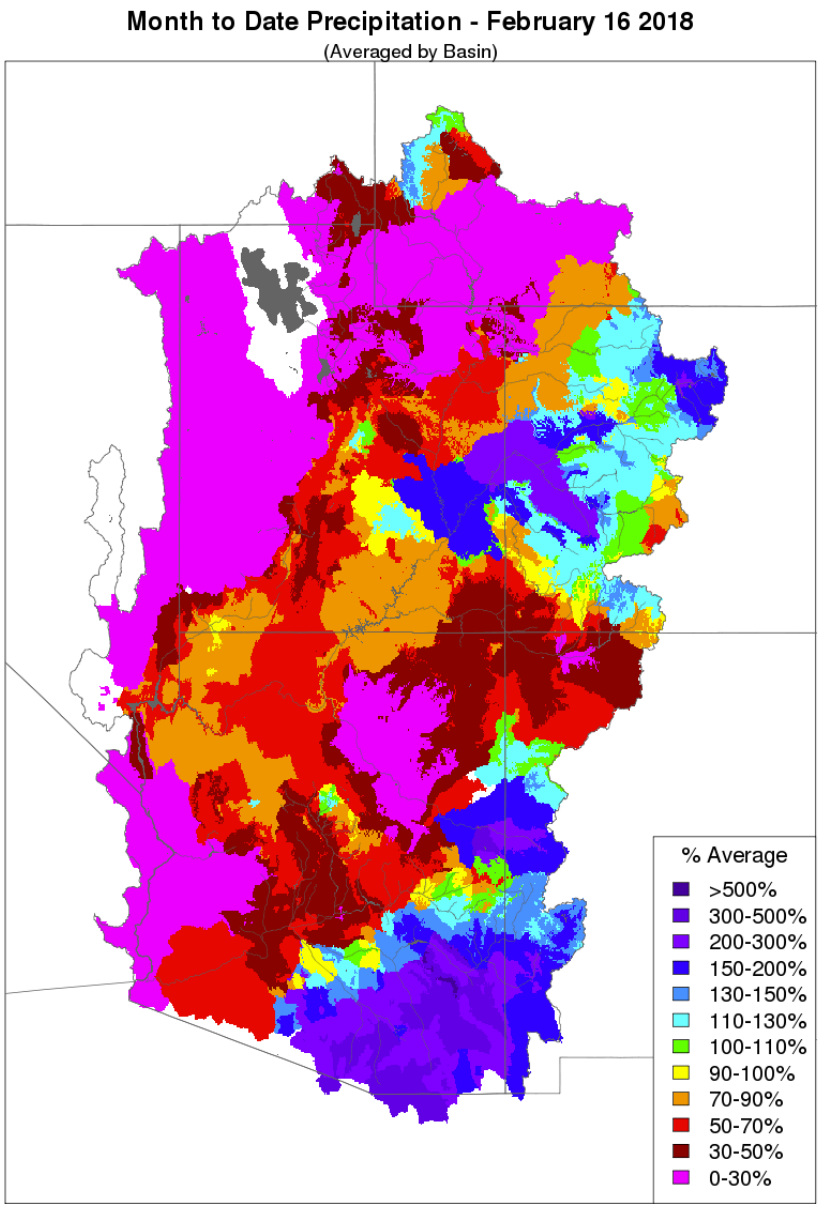
# February Weather: Partial Monthly Precipitation

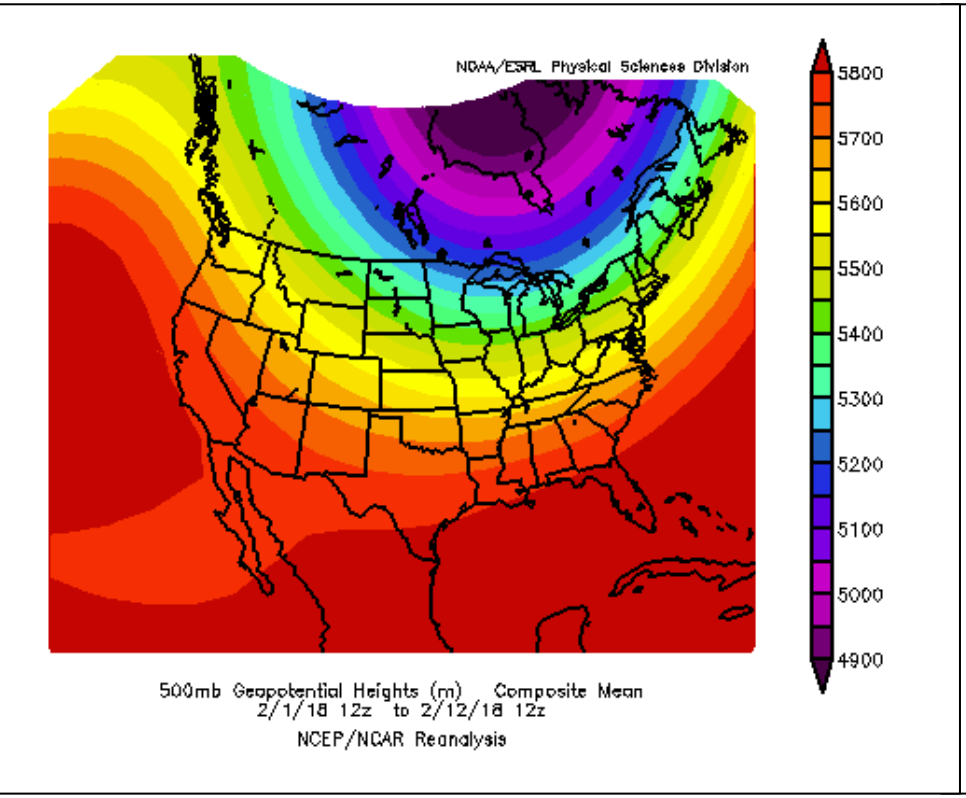


# February weather pattern – Mid month pattern change

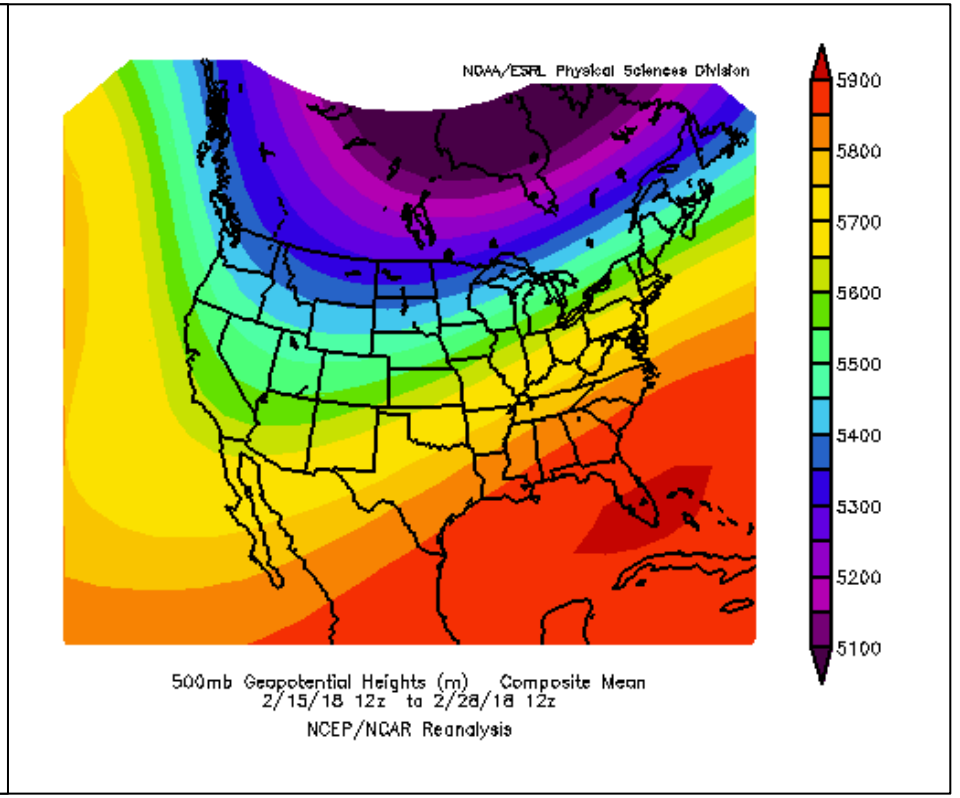
## Mean Atmospheric Pattern
## February 2018

### First half of February



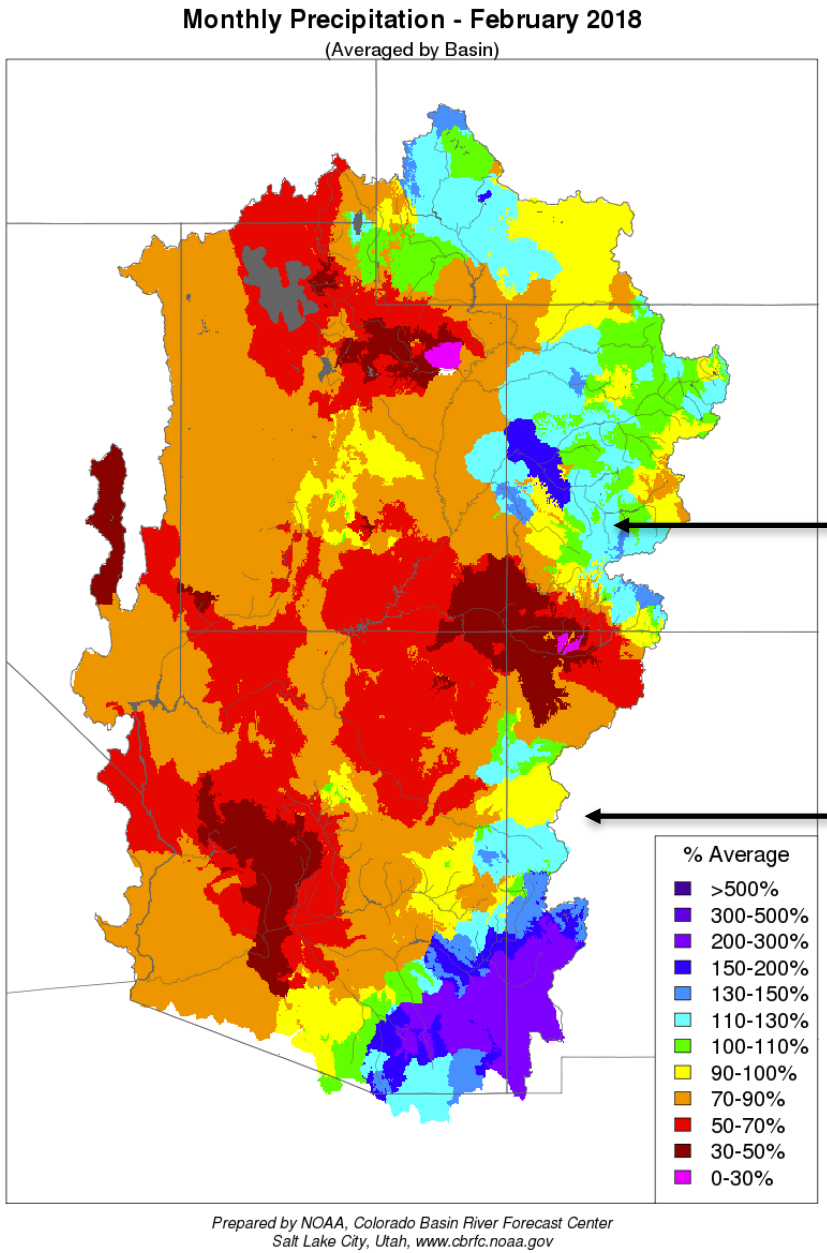

High pressure ridge – mostly dry conditions

### Second half of February




Increase in storm activity / precipitation

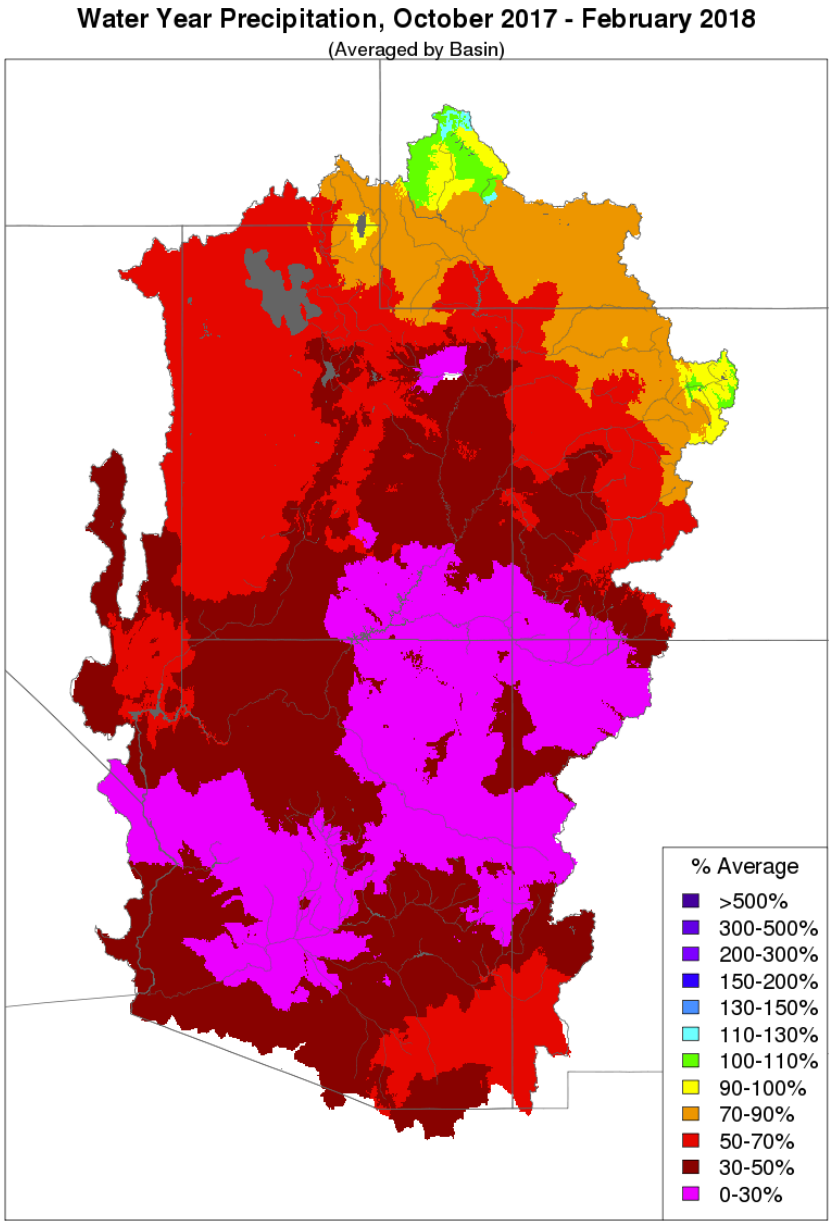
# February Weather: February Precipitation (% of average)




Gunnison & Dolores Basins – Last time precipitation was average or better was July 2017

Majority of Lower Colorado River Basin AZ/NM has been below average dating back to July 2017

# February Weather: Water Year Precipitation




## Water Year Breakdown
(Basin mean precipitation as a % of average)

Above Fontenelle

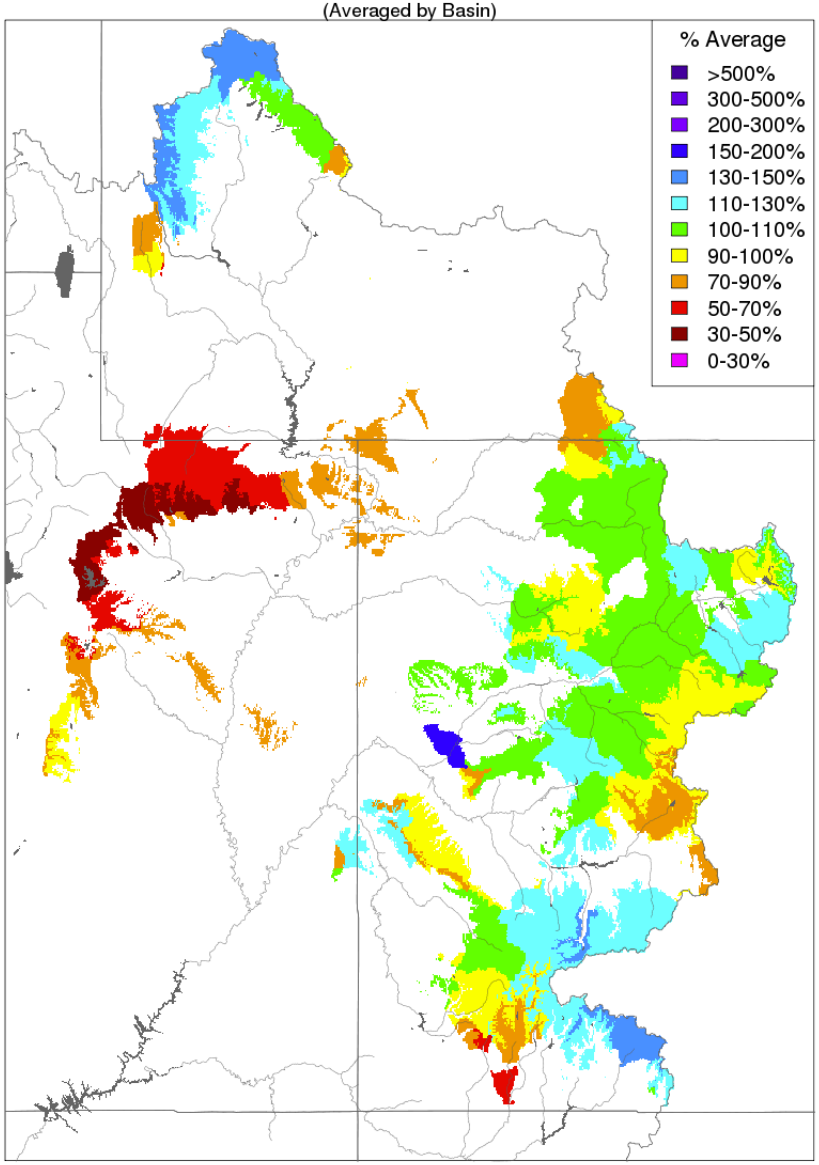
| Oct | Nov | Dec | Jan | Feb |
|---|---|---|---|---|
| 35 | 155 | 105 | 80 | 115 |

| | Oct | Nov | Dec | Jan | Feb |
|---|---|---|---|---|---|
| Upper Green | 35 | 80 | 90 | 85 | 90 |
| Yampa-White | 85 | 65 | 55 | 75 | 100 |
| Duchesne | 20 | 80 | 50 | 70 | 50 |
| CO Mainstem | 100 | 55 | 65 | 85 | 105 |
| Gunnison | 50 | 45 | 35 | 75 | 100 |
| Dolores | 30 | 25 | 20 | 75 | 100 |
| San Juan | 20 | 30 | 20 | 60 | 115 |
| Virgin | * | 15 | 20 | 90 | 75 |
| Little Colorado | * | * | * | 50 | 85 |
| Salt-Verde | * | * | * | 50 | 80 |
| Gila | 5 | 5 | 20 | 25 | 160 |

* Less than 5% of average

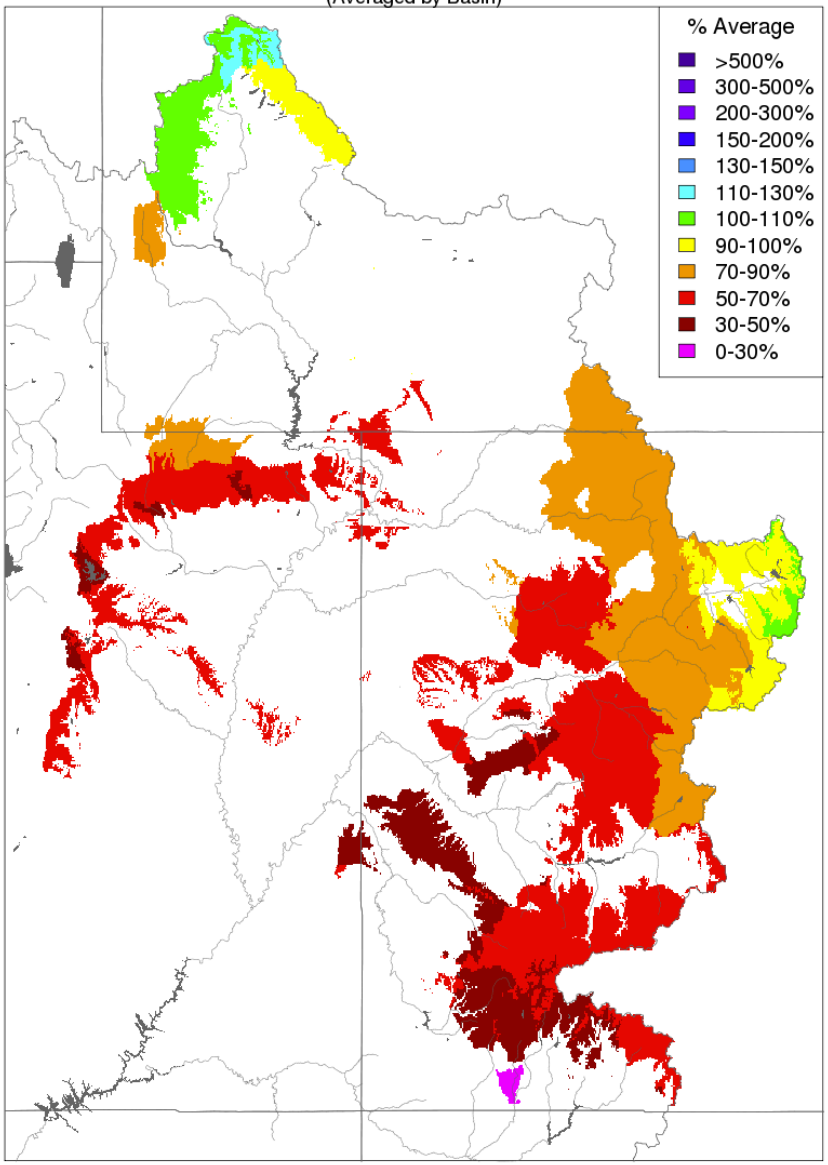
# February Weather: February & October-February Precipitation
## (Primary contributing areas to April-July water supply runoff)

**Monthly Precipitation - February 2018**
(Averaged by Basin)




*Prepared by NOAA, Colorado Basin River Forecast Center*
*Salt Lake City, Utah, www.cbrfc.noaa.gov*

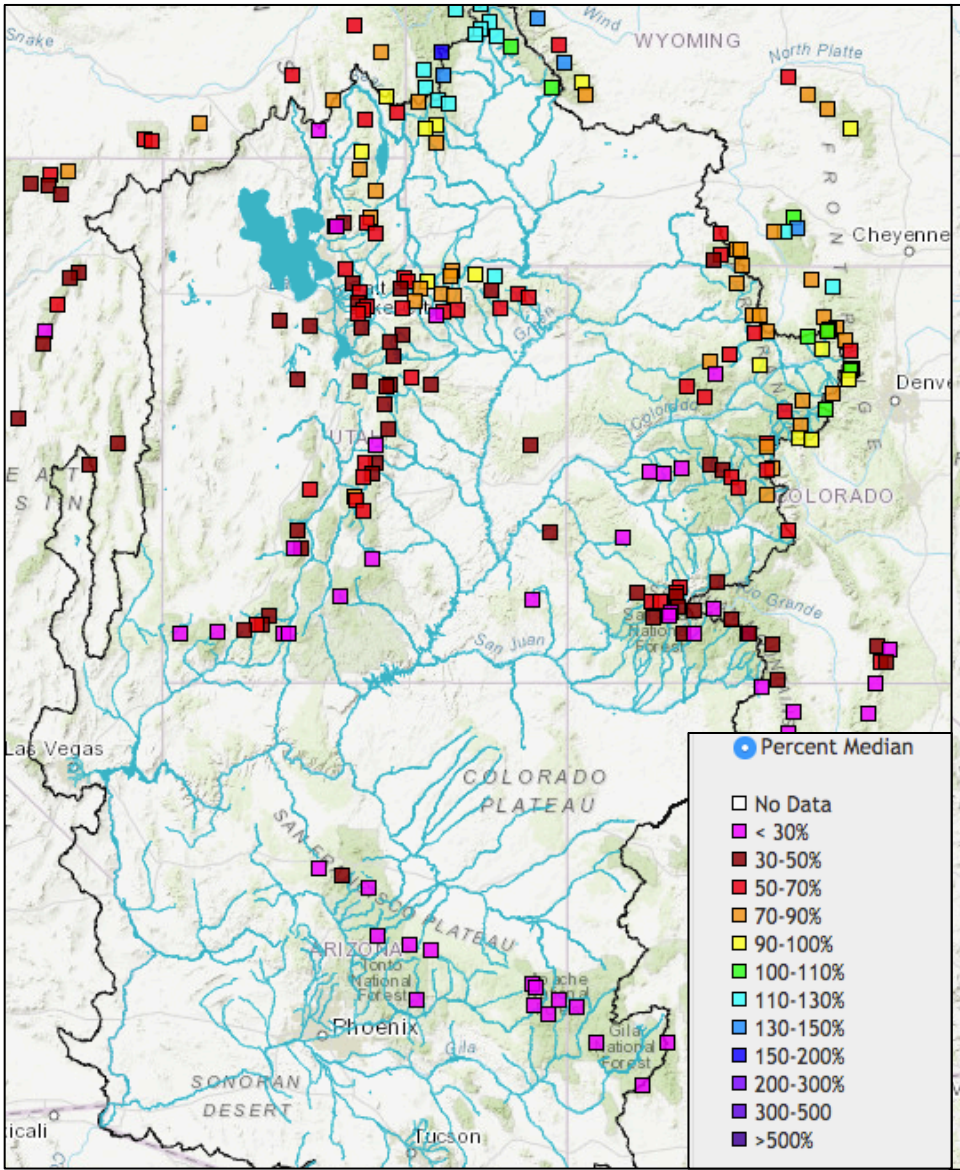
**Water Year Precipitation, October 2017 - February 2018**
(Averaged by Basin)



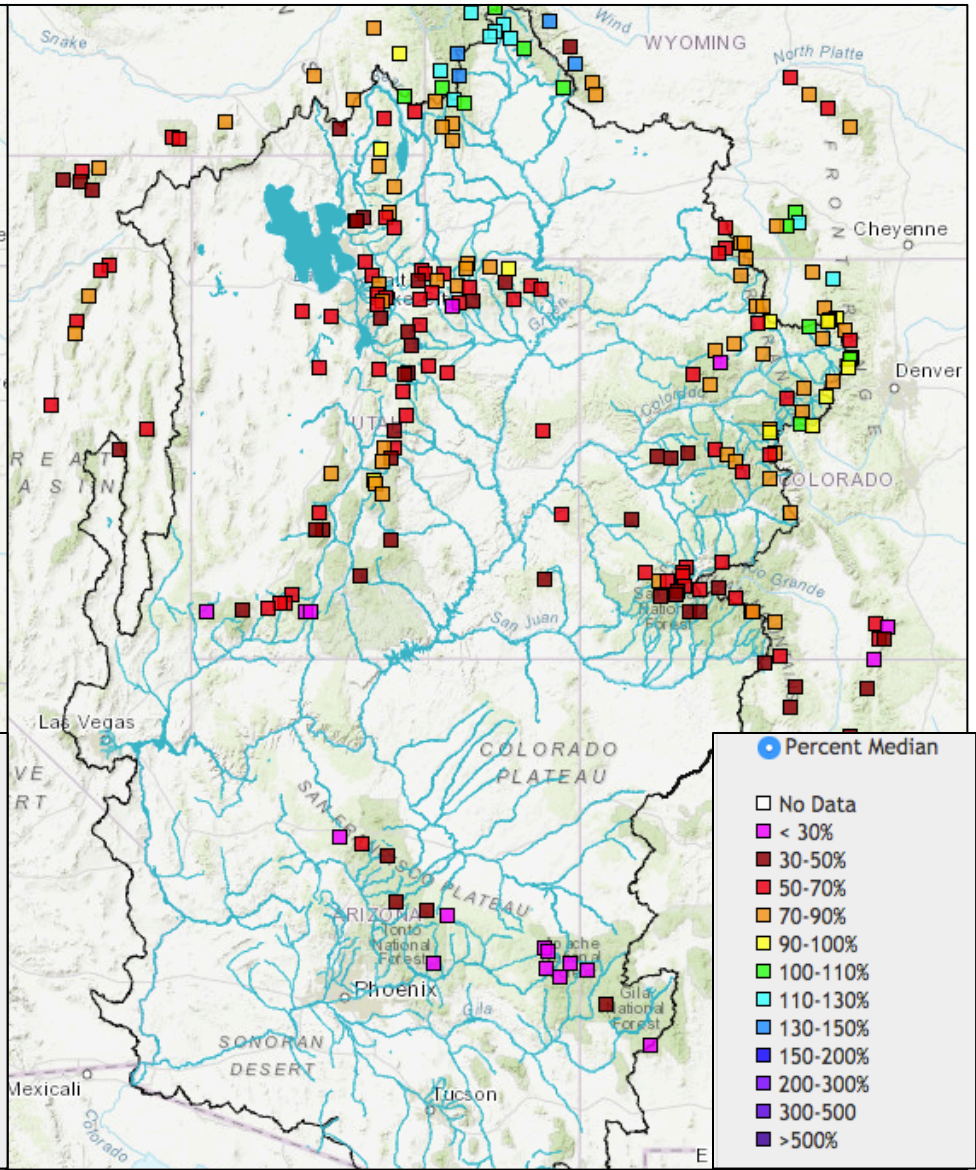

*Prepared by NOAA, Colorado Basin River Forecast Center*
*Salt Lake City, Utah, www.cbrfc.noaa.gov*

# Snow Conditions – SNOTEL Snow Water Equivalent (1981-2010 % of median)

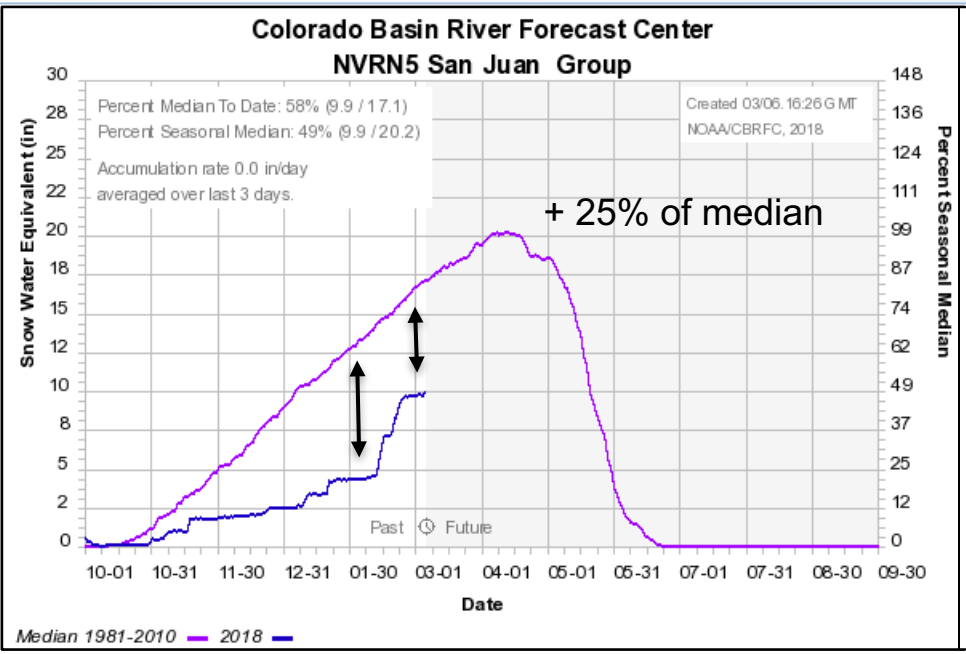
February 6th 2018

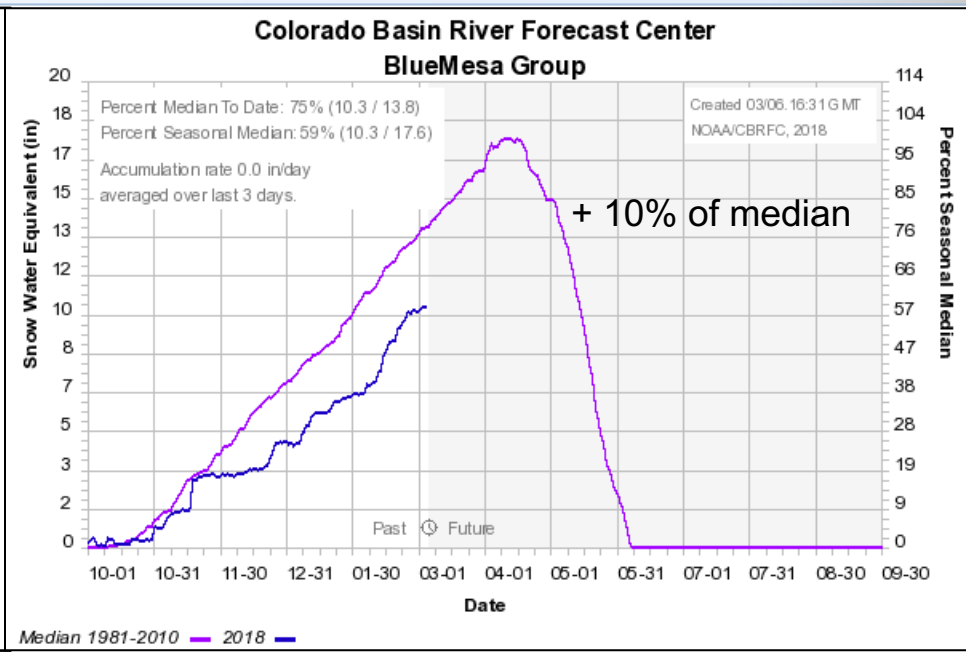


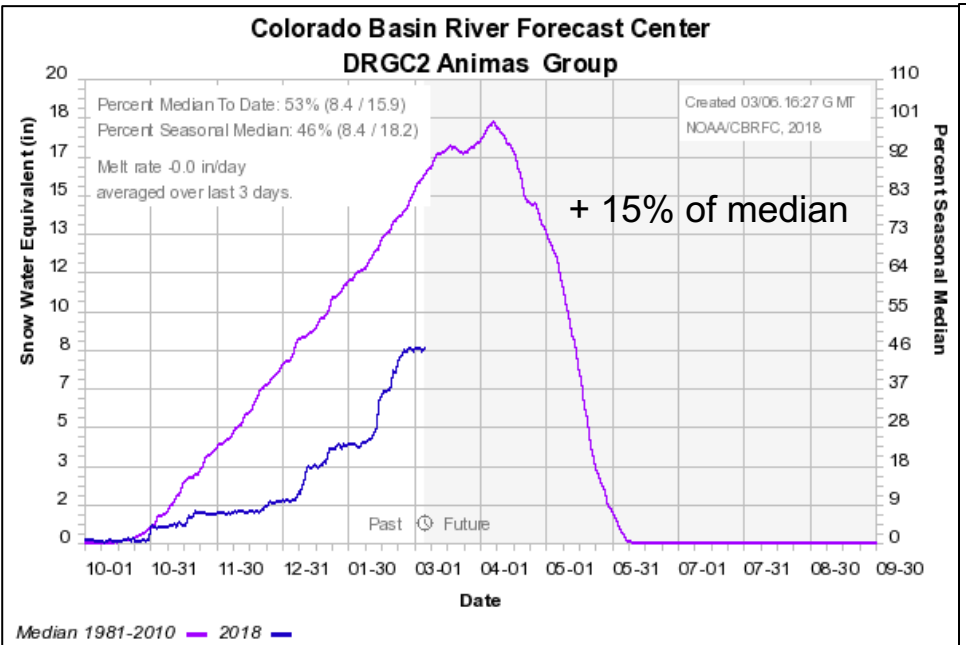

March 6th 2018

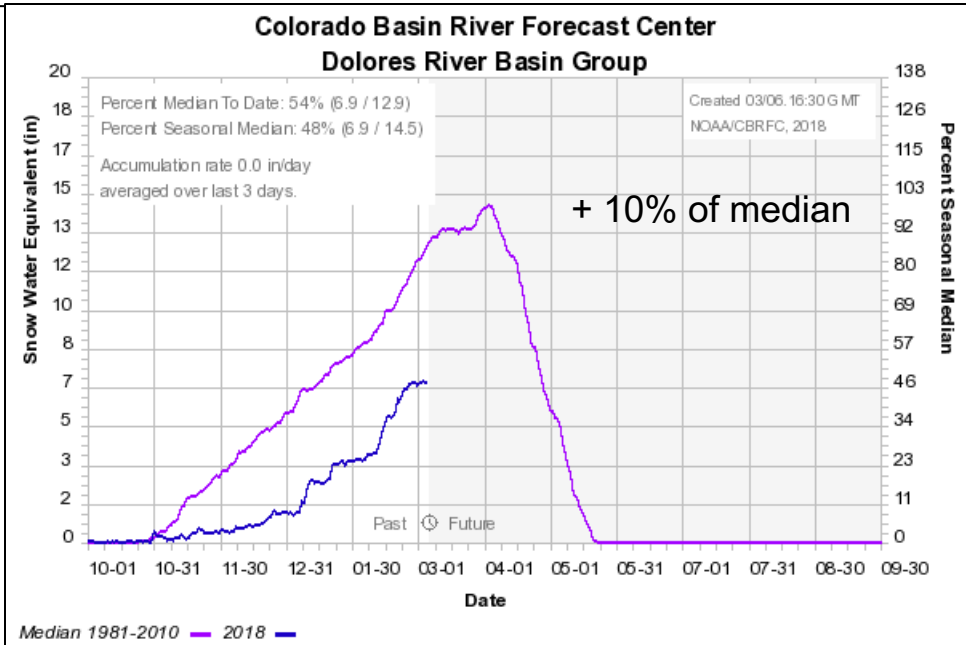


# Snow Conditions – Where did conditions stay the same or improve (as a % of median) ?



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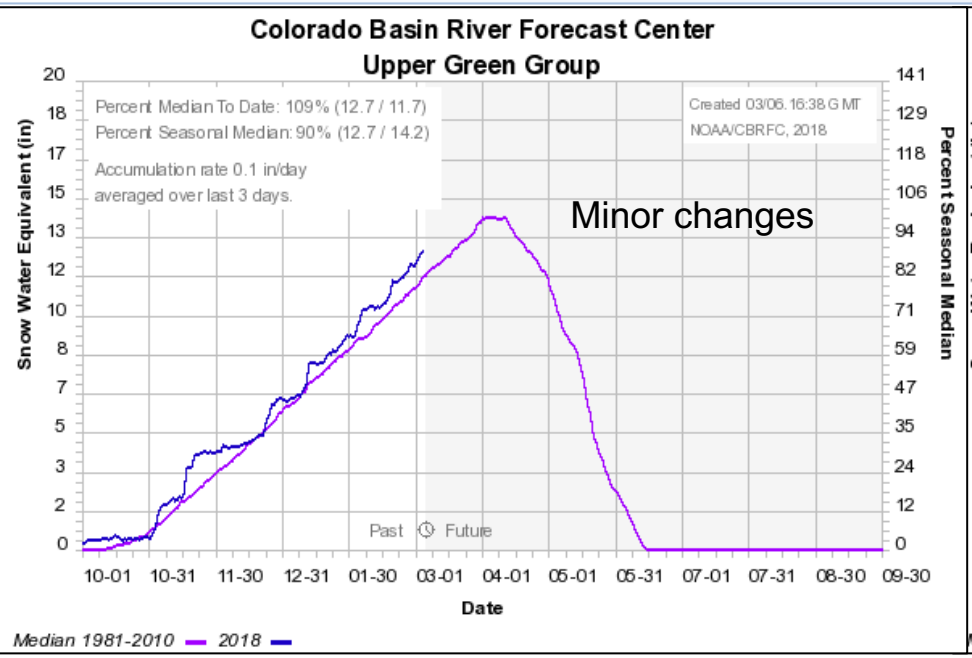


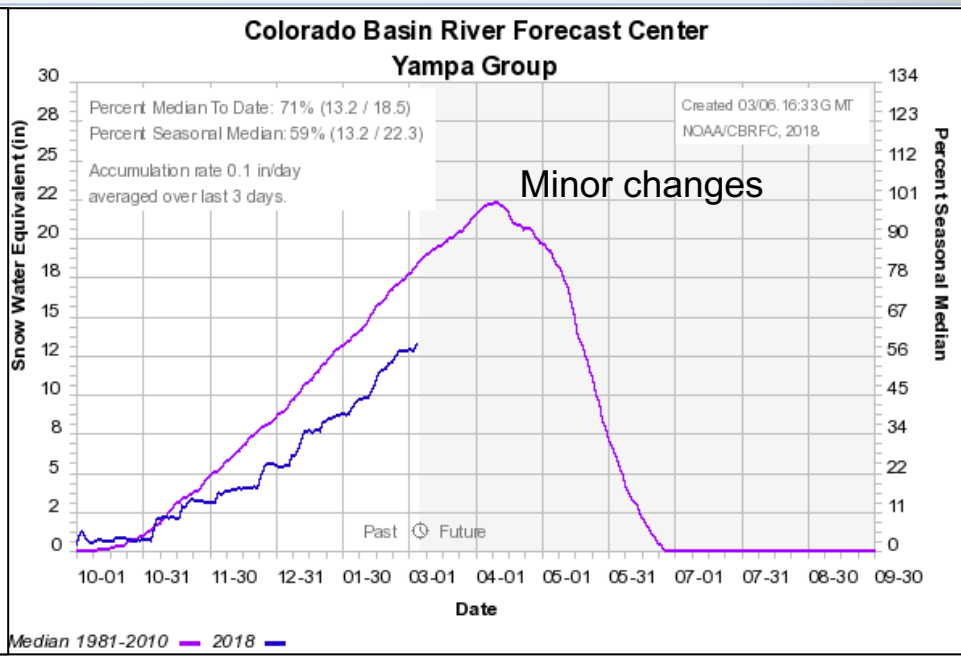


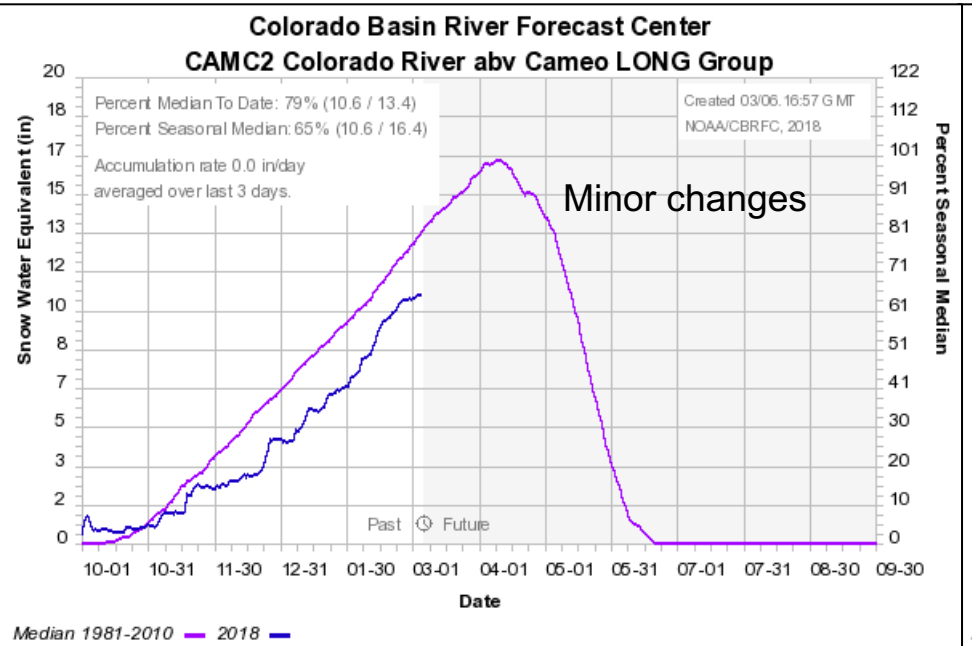


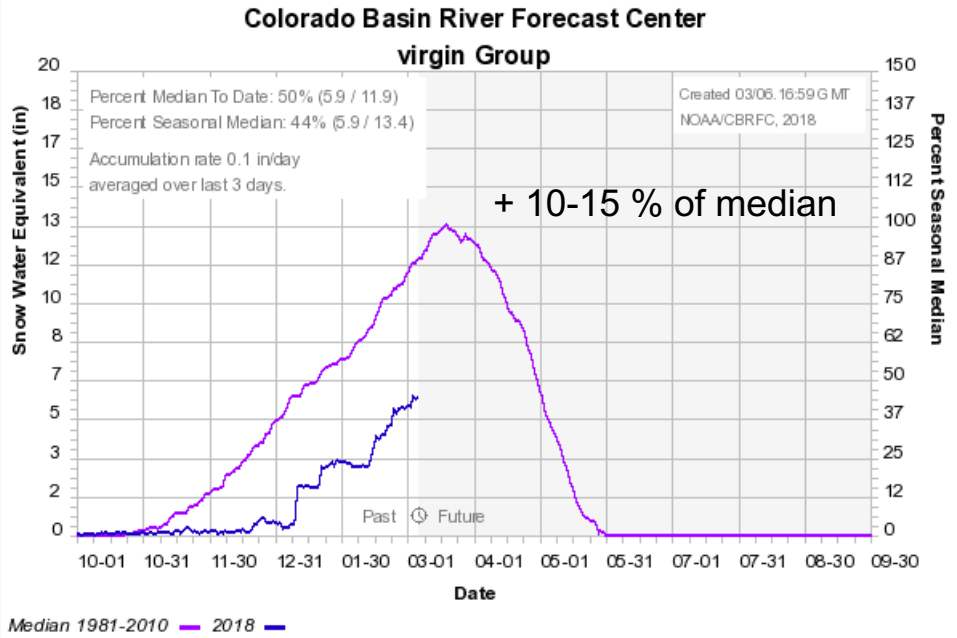

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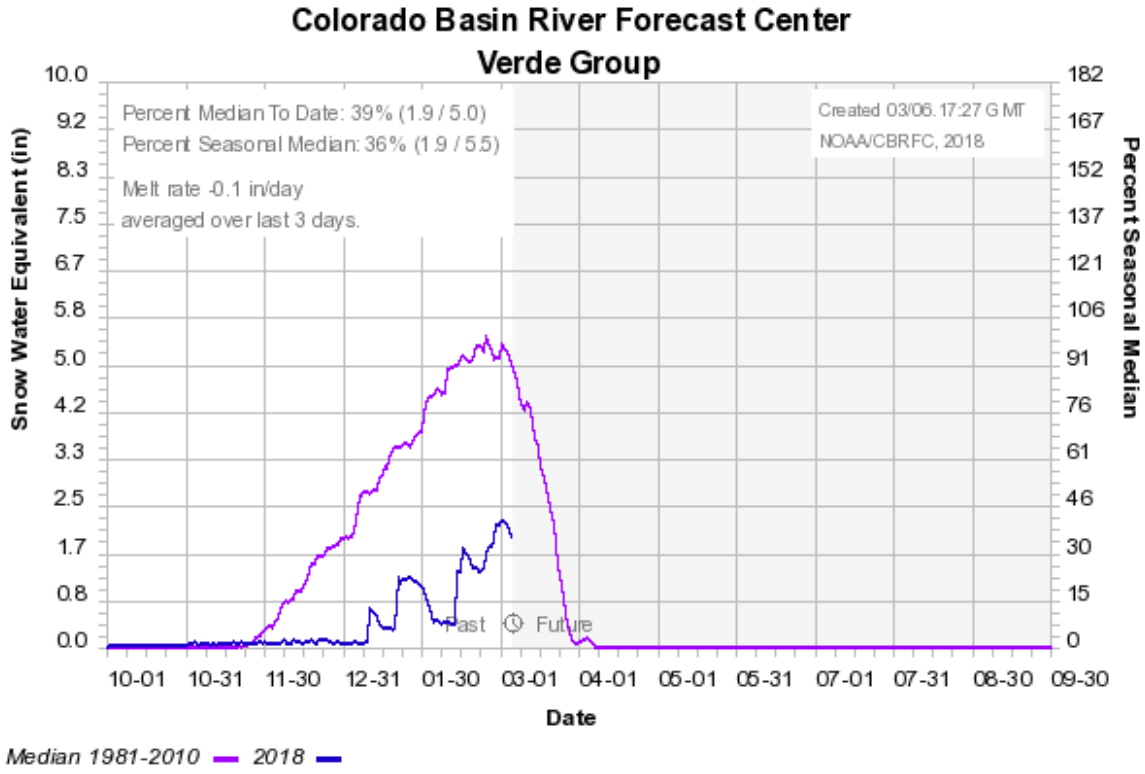
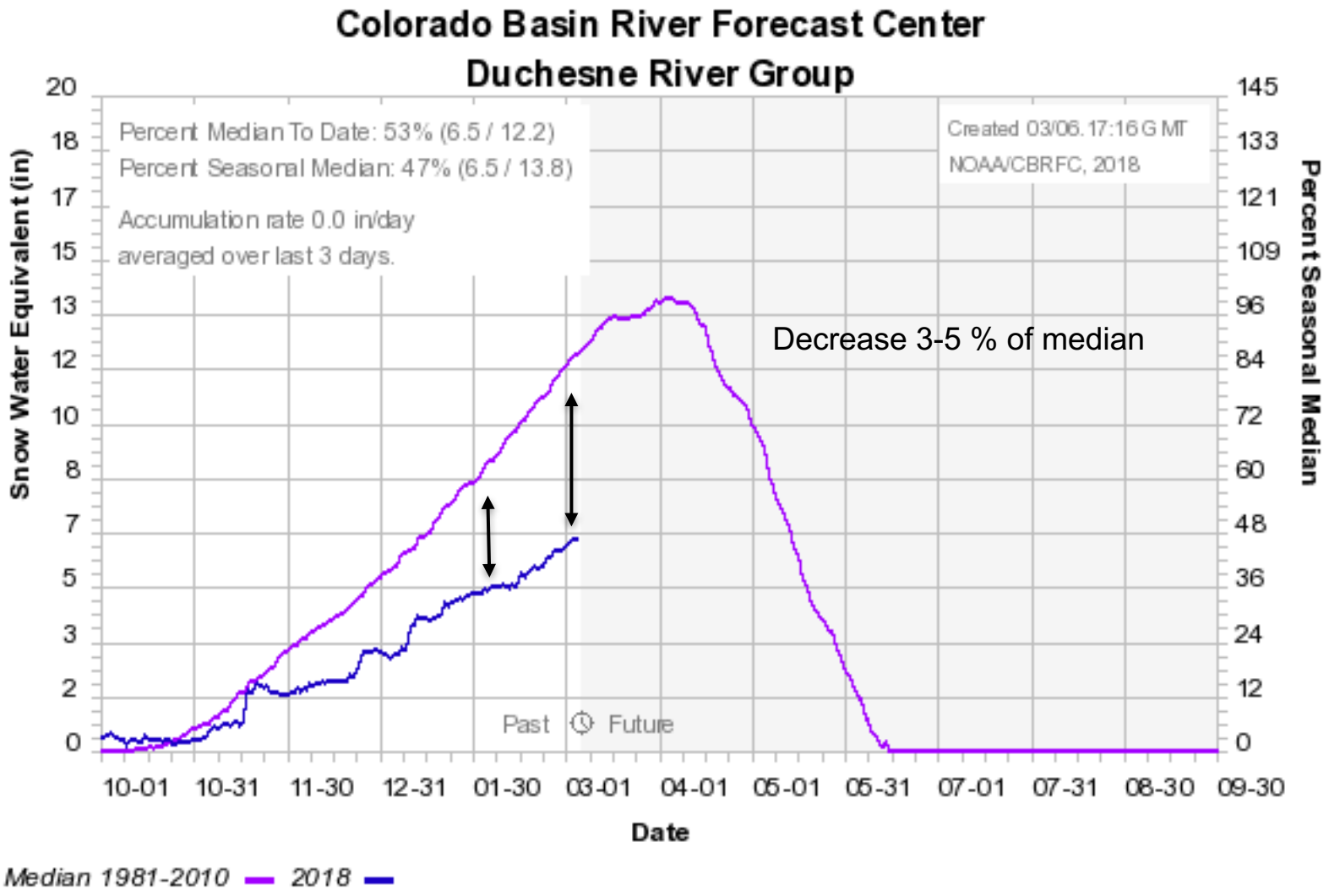



Early February to Early March
Increase from near 10% to near 40% of median

# Snow Conditions – Where did conditions get worse (as a % of median) ?

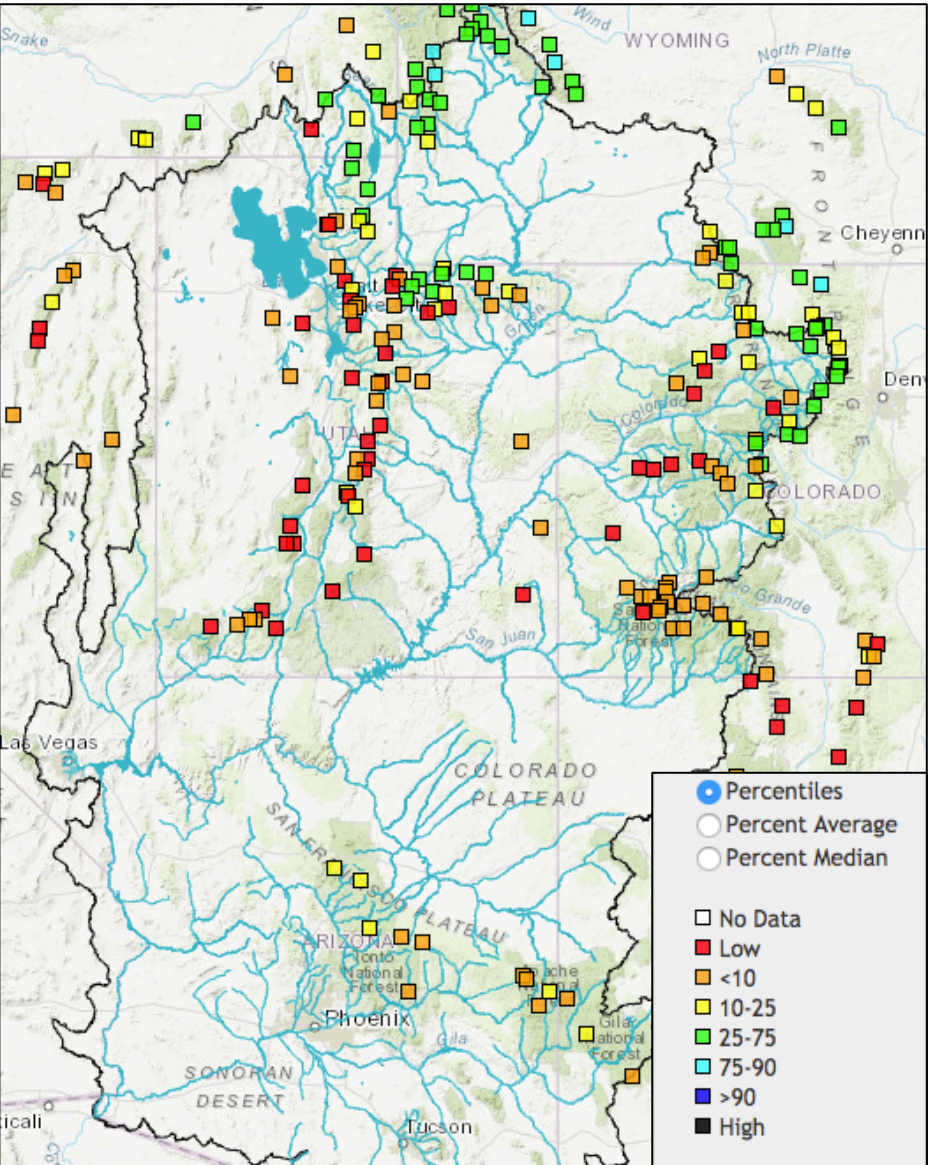


# Snow Conditions – A lot of sites still at record lows

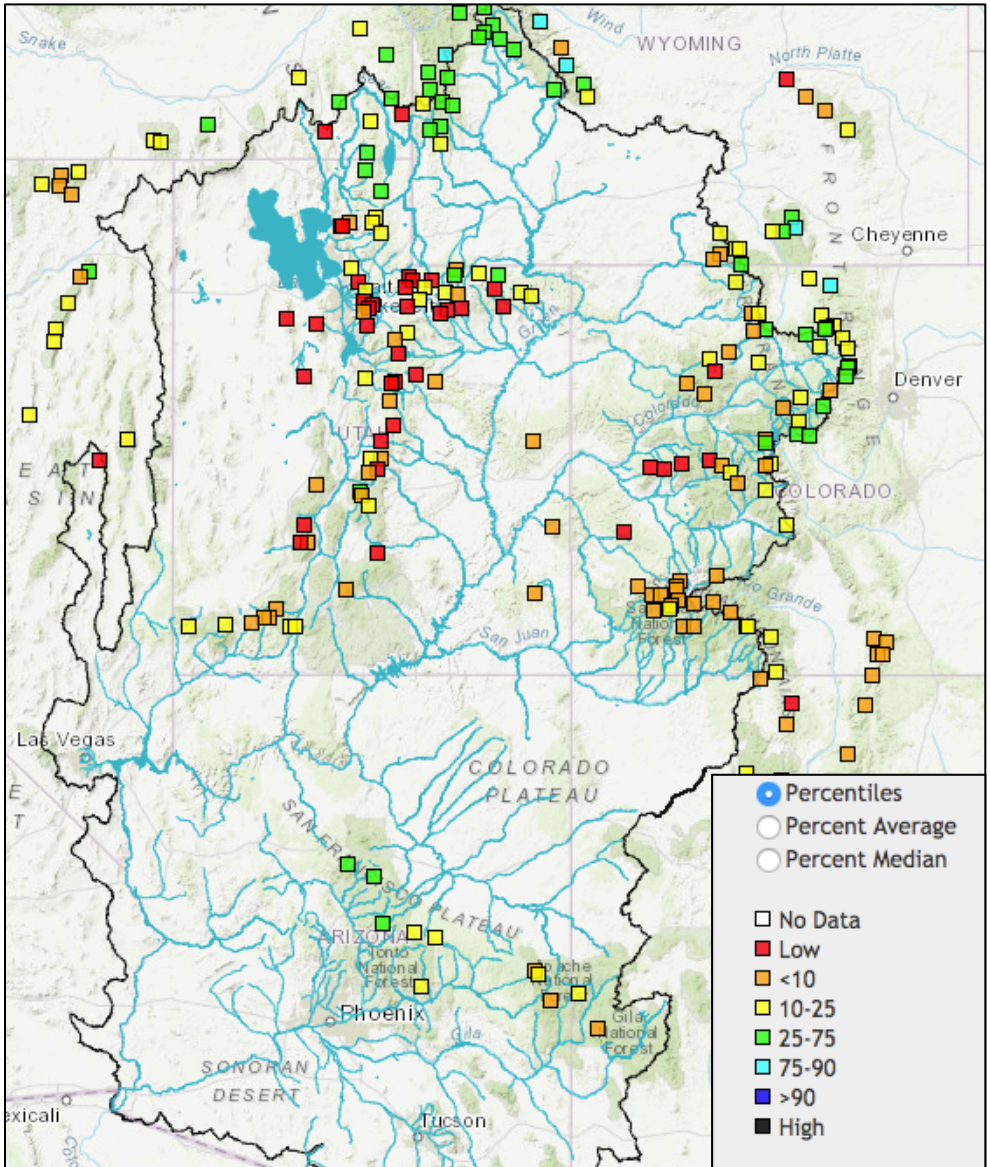
## SWE Historical Rankings

Red – Lowest on record
Orange – Bottom 2-4 of record

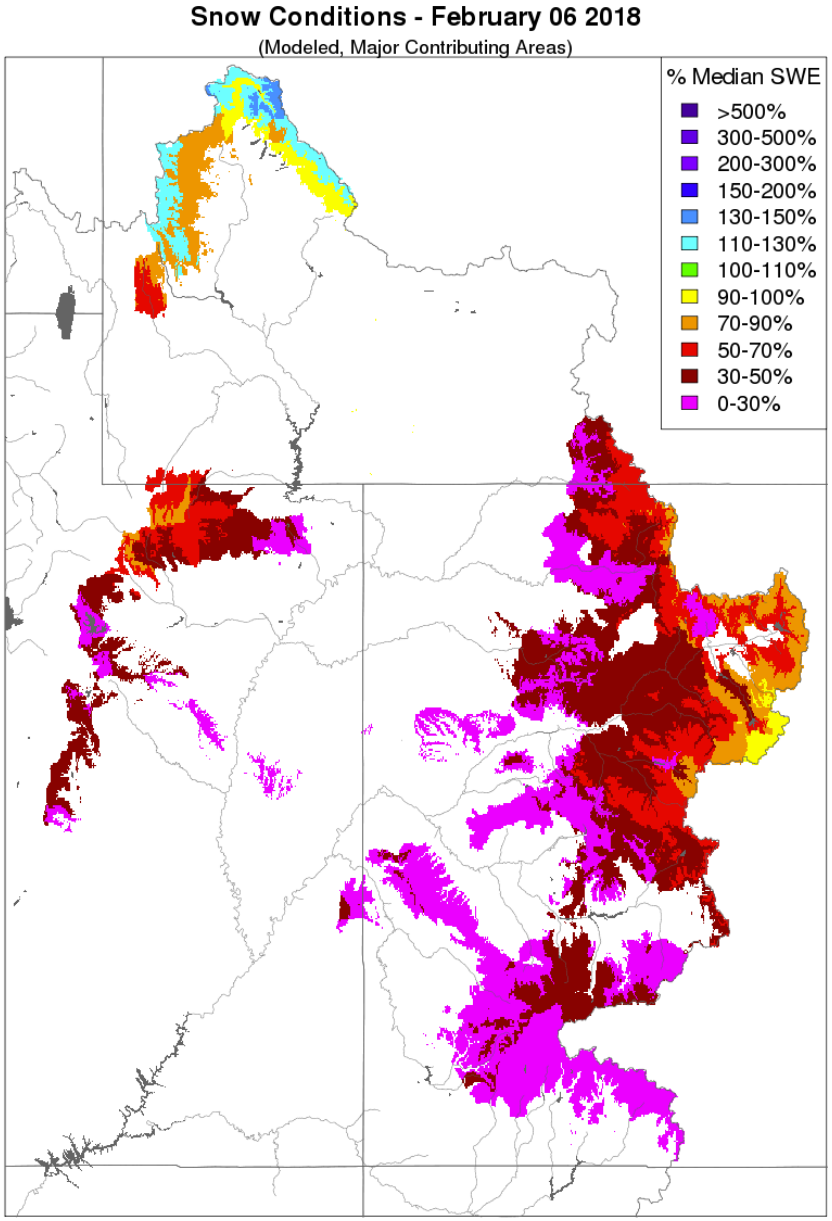
February 6th 2018

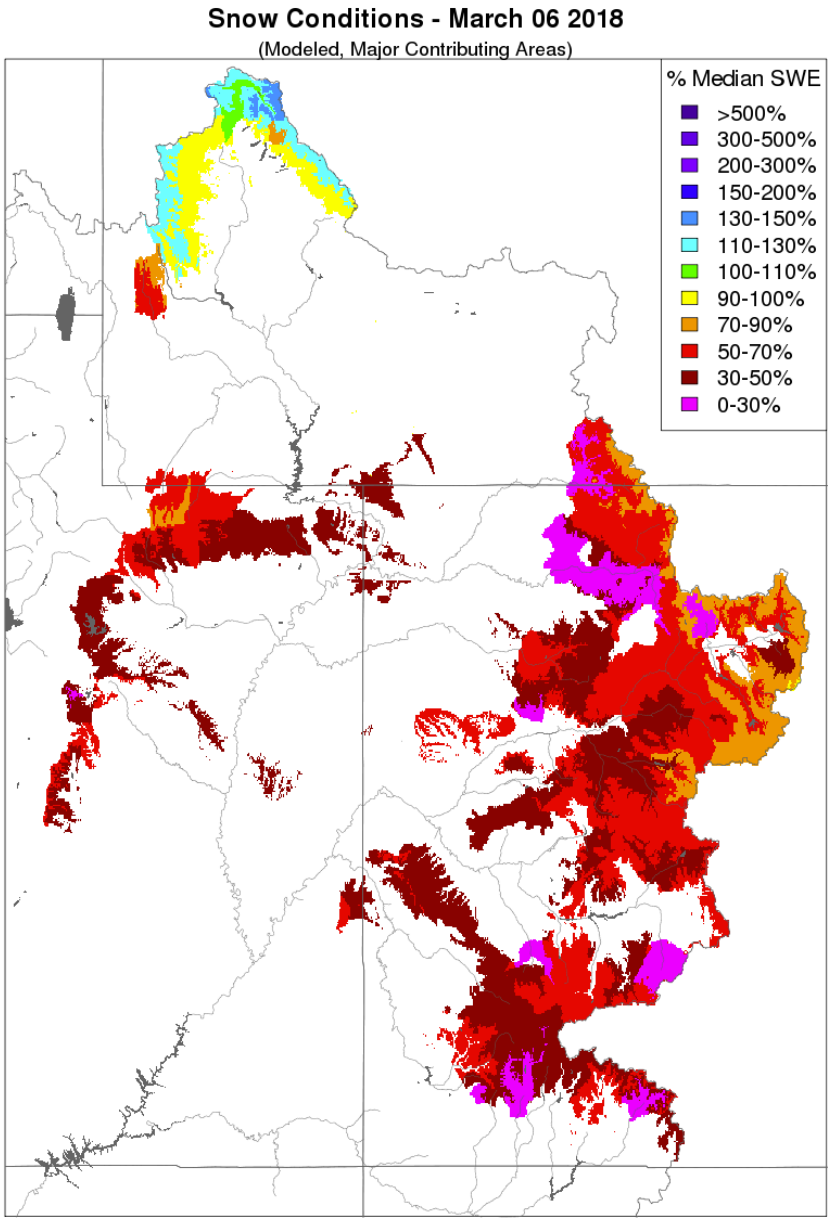



March 6th 2018



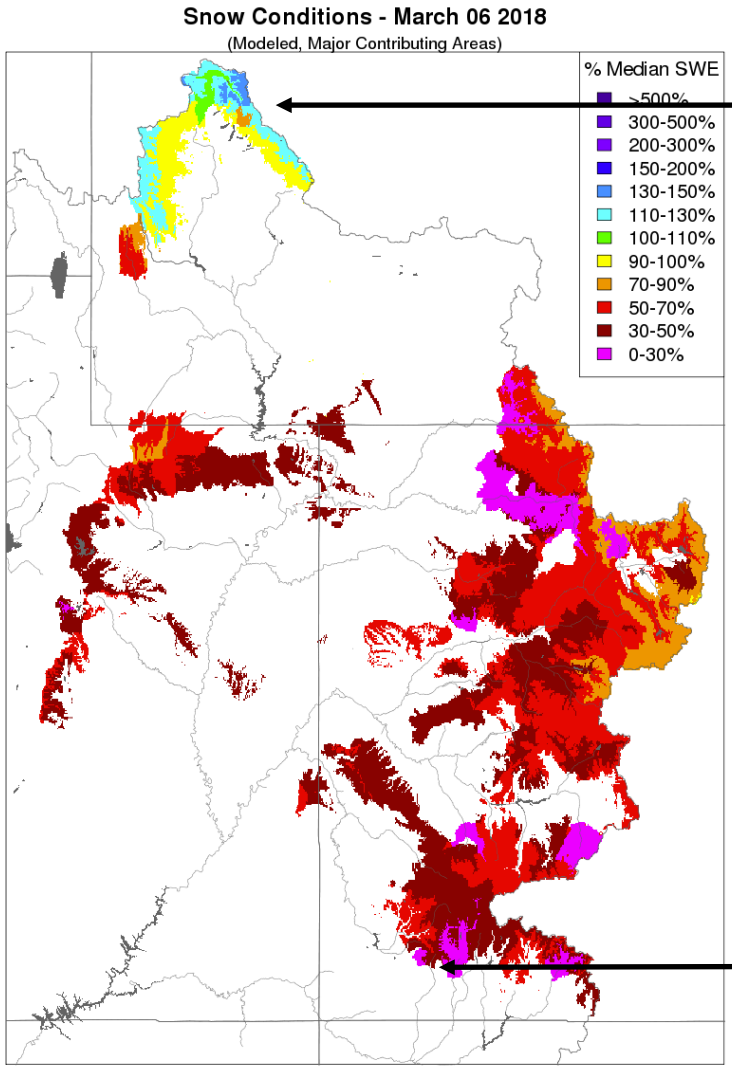
# Snow Condition (as represented in the hydrologic model)



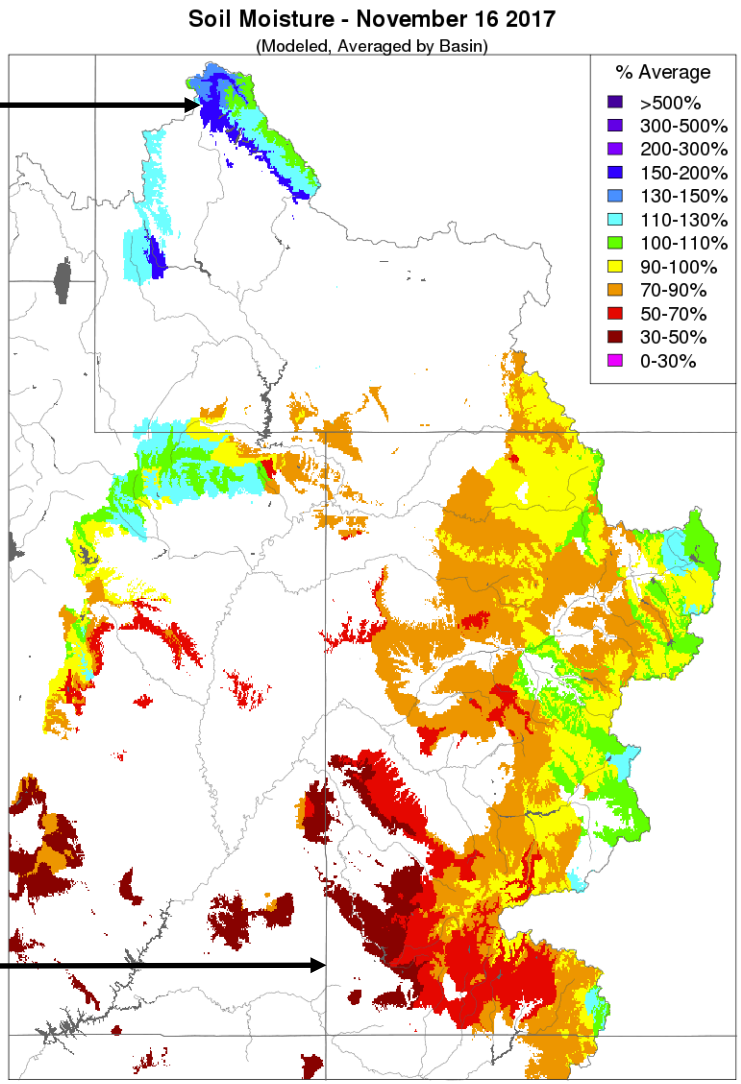
# Soil Moisture Impacts (entering winter, prior to the onset of snow)

Greatest impacts are where snowpack conditions and soil moisture show the same signal
Impact forecast volumes +/- 5 -10 % of average



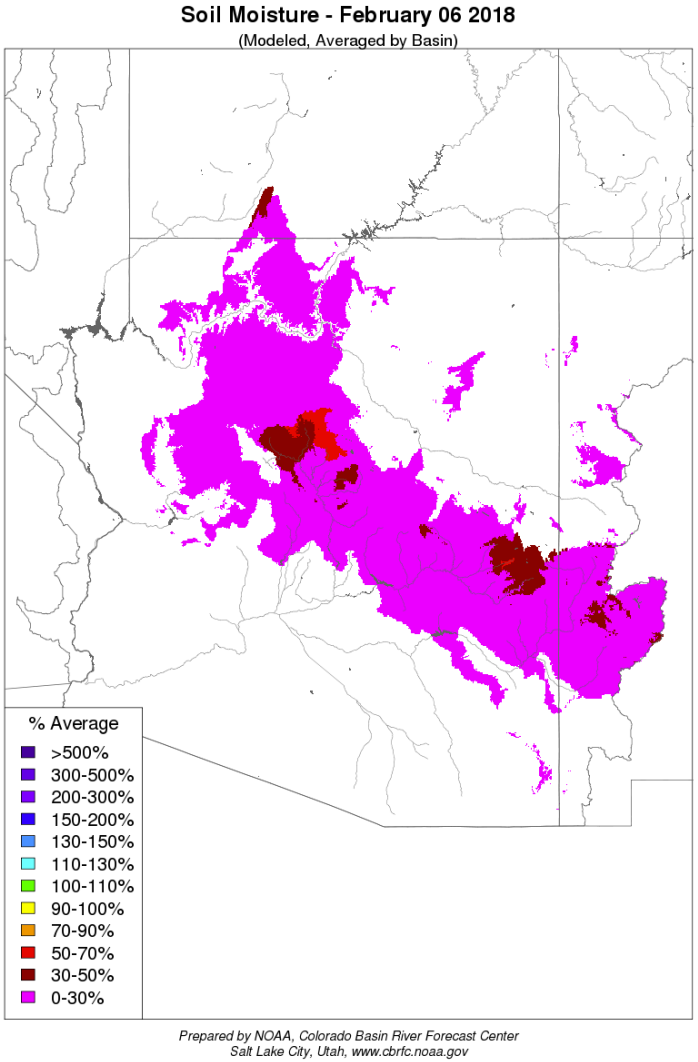

Positive
Upper Green

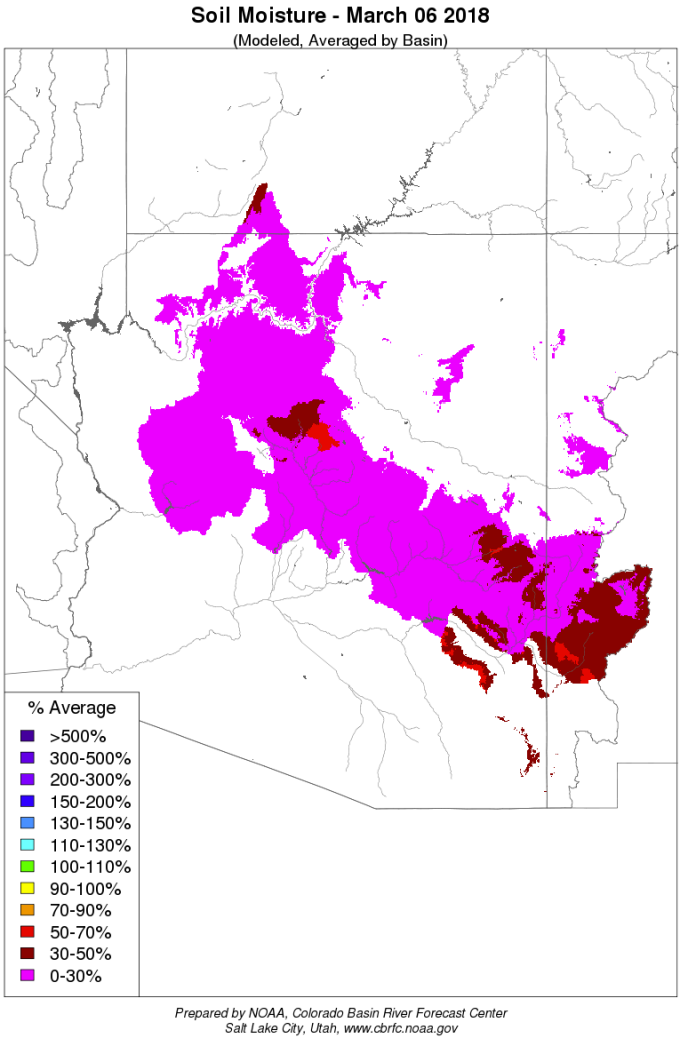
Negative
Western San Juan
Animas
Dolores



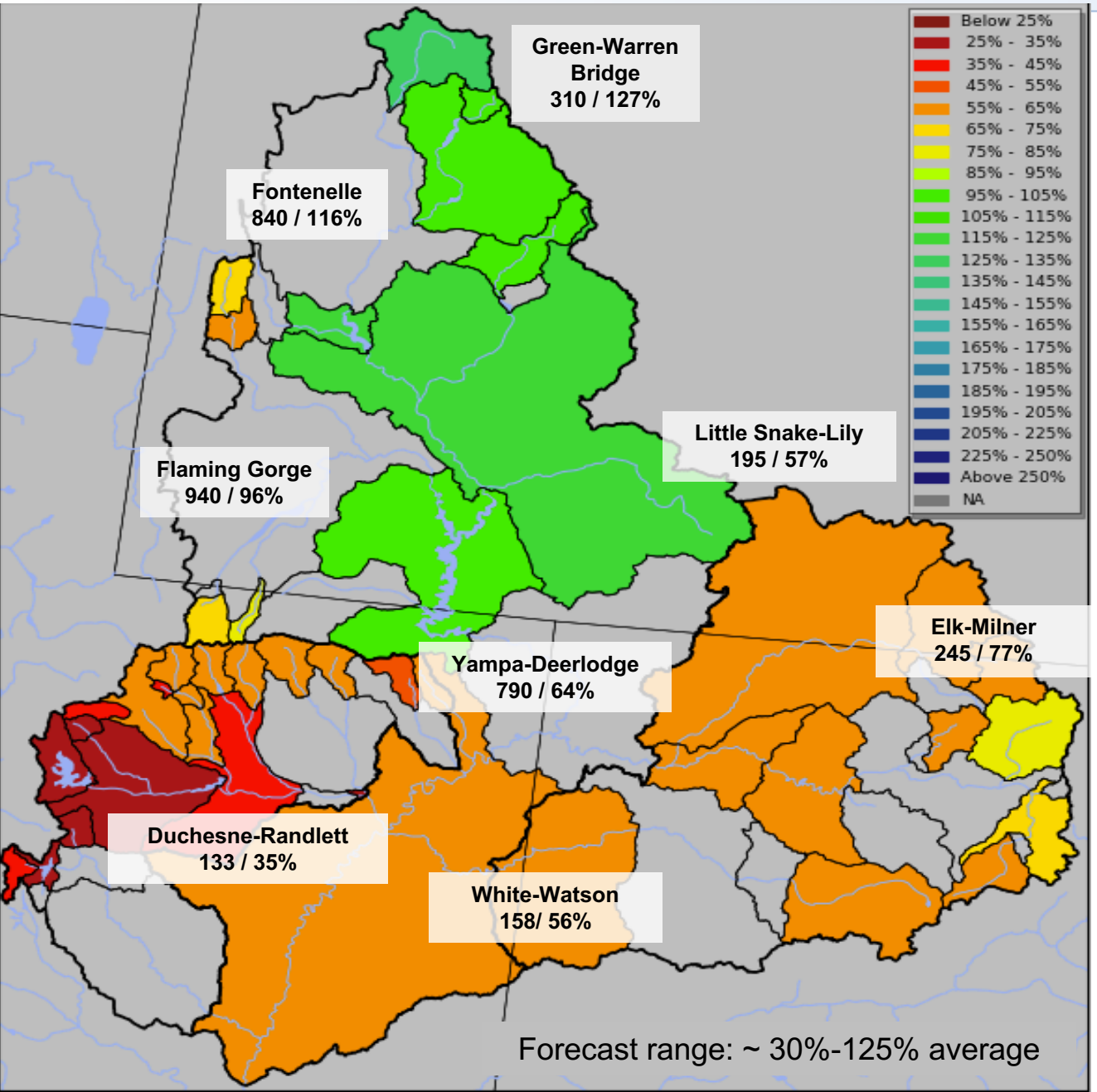
# Soil Moisture Impacts - Lower Colorado River Basin

Below average precipitation dates back to August
Any precipitation events are unlikely to product significant runoff initially-climatology indicates drier period ahead
Above average precipitation in Gila Basin in February produced near to below median runoff



# Upper Colorado: Green-Yampa-White-Duchesne




Forecasts as of Mar 1 2018

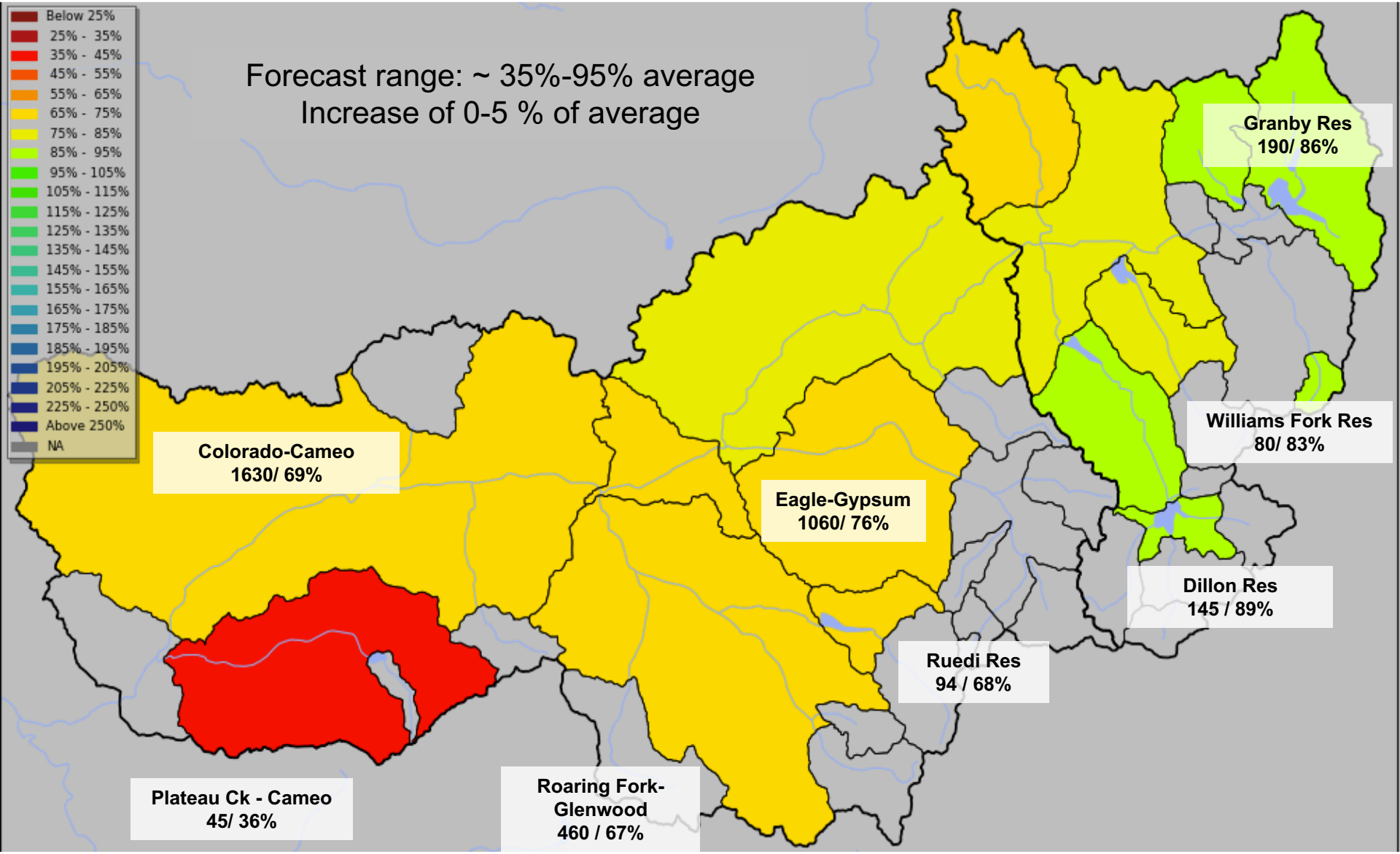
Volume 1000's acre feet /
% of 1981-2010 average

Duchesne:
Decrease of 5-10% of average

Upper Green:
Increase of 0-15% of average

# Upper Colorado: Colorado River Mainstem

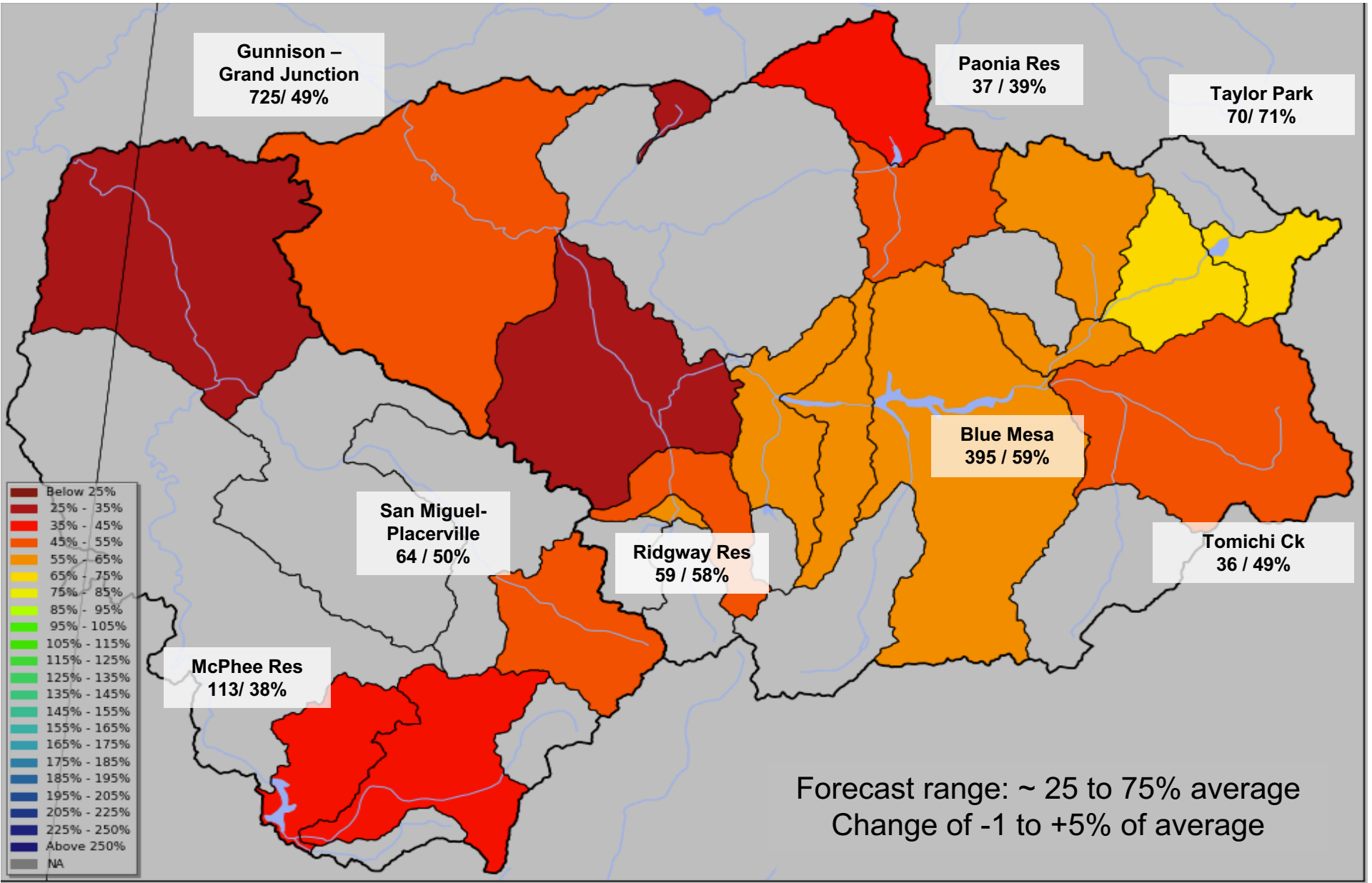
Forecasts as of Mar 1 2018
Volume in 1000's acre-feet / % of 1981-2010 average



# Upper Colorado: Gunnison and Dolores Basins

Forecasts as of Mar 1 2018

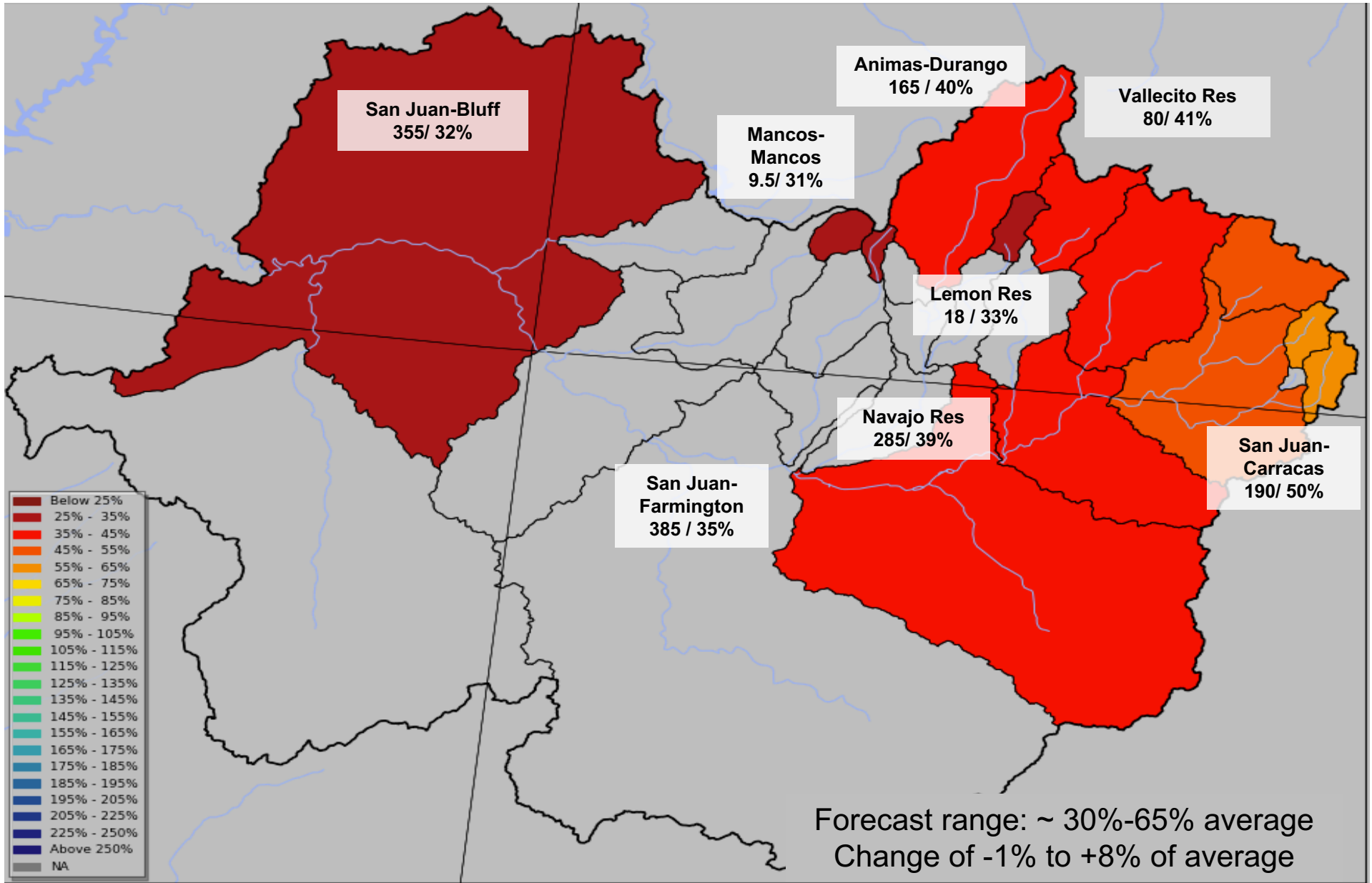
Volume in 1000's acre-feet / % of 1981-2010 average



# Upper Colorado: San Juan Basin

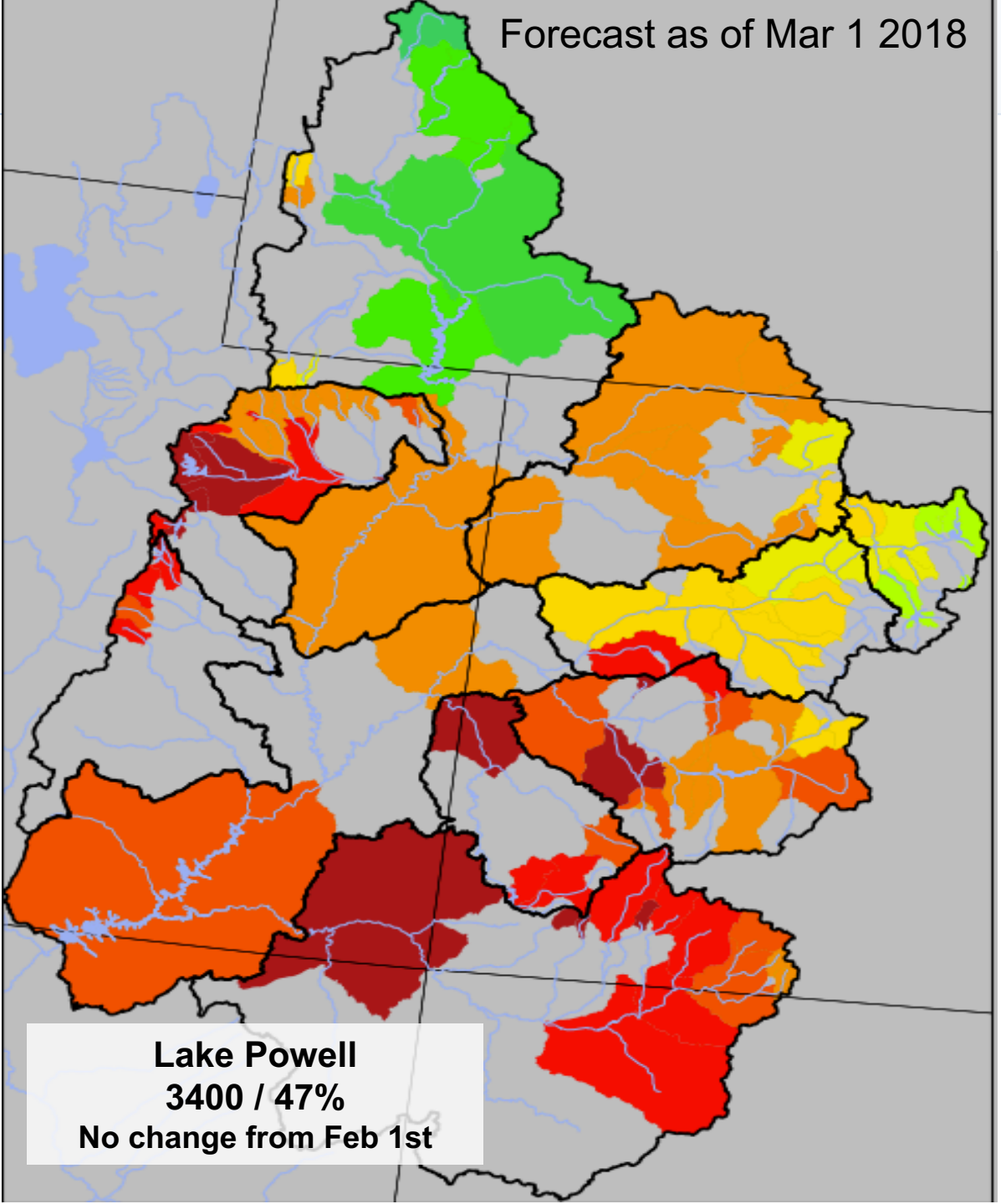
Forecasts as of Mar 1 2018

Volume in 1000's acre-feet / % of 1981-2010 average




Forecast range: ~ 30%-65% average

Change of -1% to +8% of average




# Upper Colorado April-July Streamflow Volume Forecasts

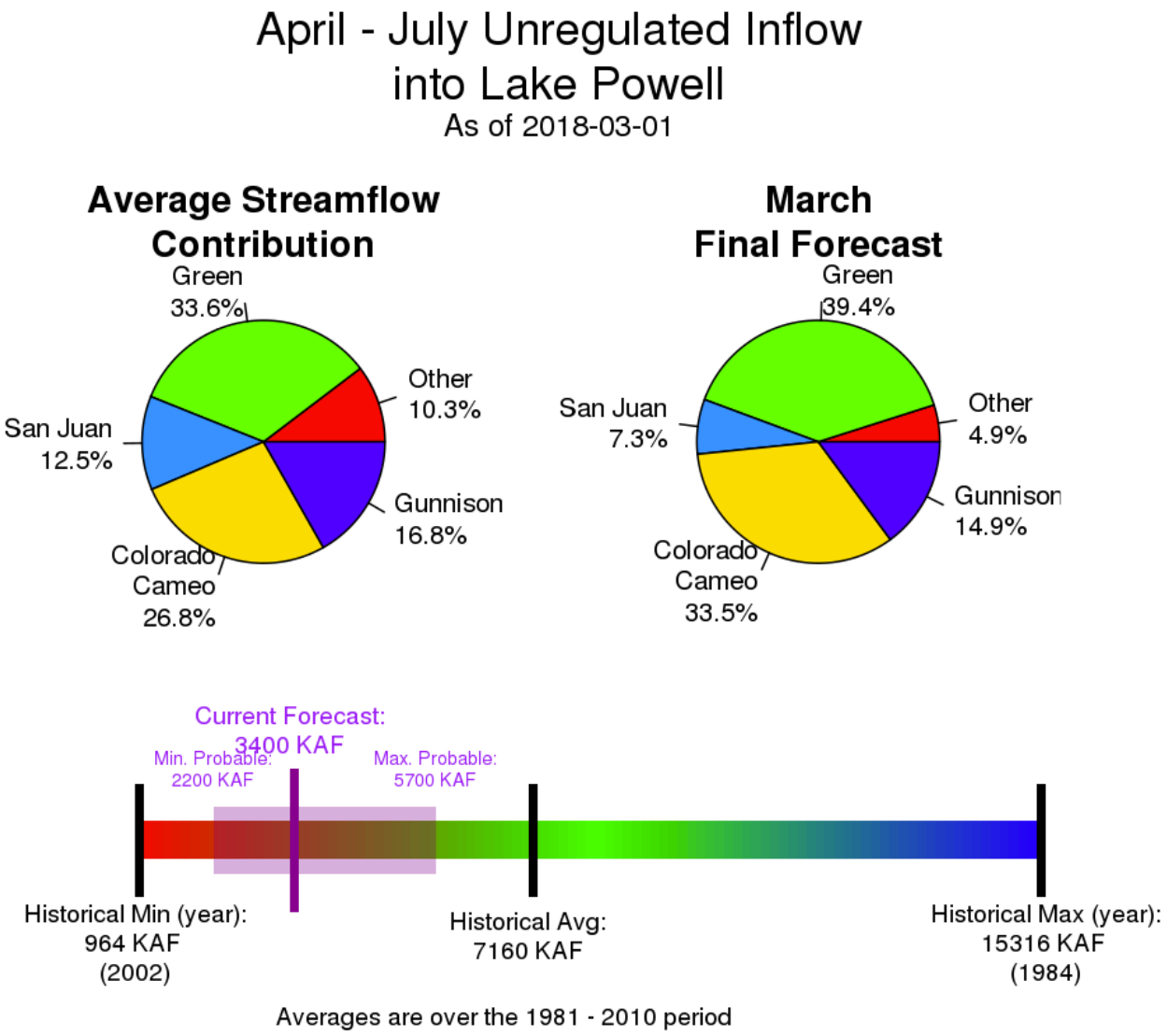
(% of 1981-2010 average)

Lake Powell:
3400 KAF / 47 % average

- Below 25%
- 25% - 35%
- 35% - 45%
- 45% - 55%
- 55% - 65%
- 65% - 75%
- 75% - 85%
- 85% - 95%
- 95% - 105%
- 105% - 115%
- 115% - 125%
- 125% - 135%
- 135% - 145%
- 145% - 155%
- 155% - 165%
- 165% - 175%
- 175% - 185%
- 185% - 195%
- 195% - 205%
- 205% - 225%
- 225% - 250%
- Above 250%
- NA

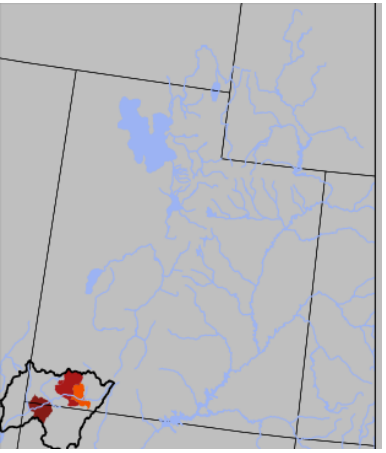
# Lake Powell – Forecast Inflow Distribution Comparison – 2018 vs Historical Average

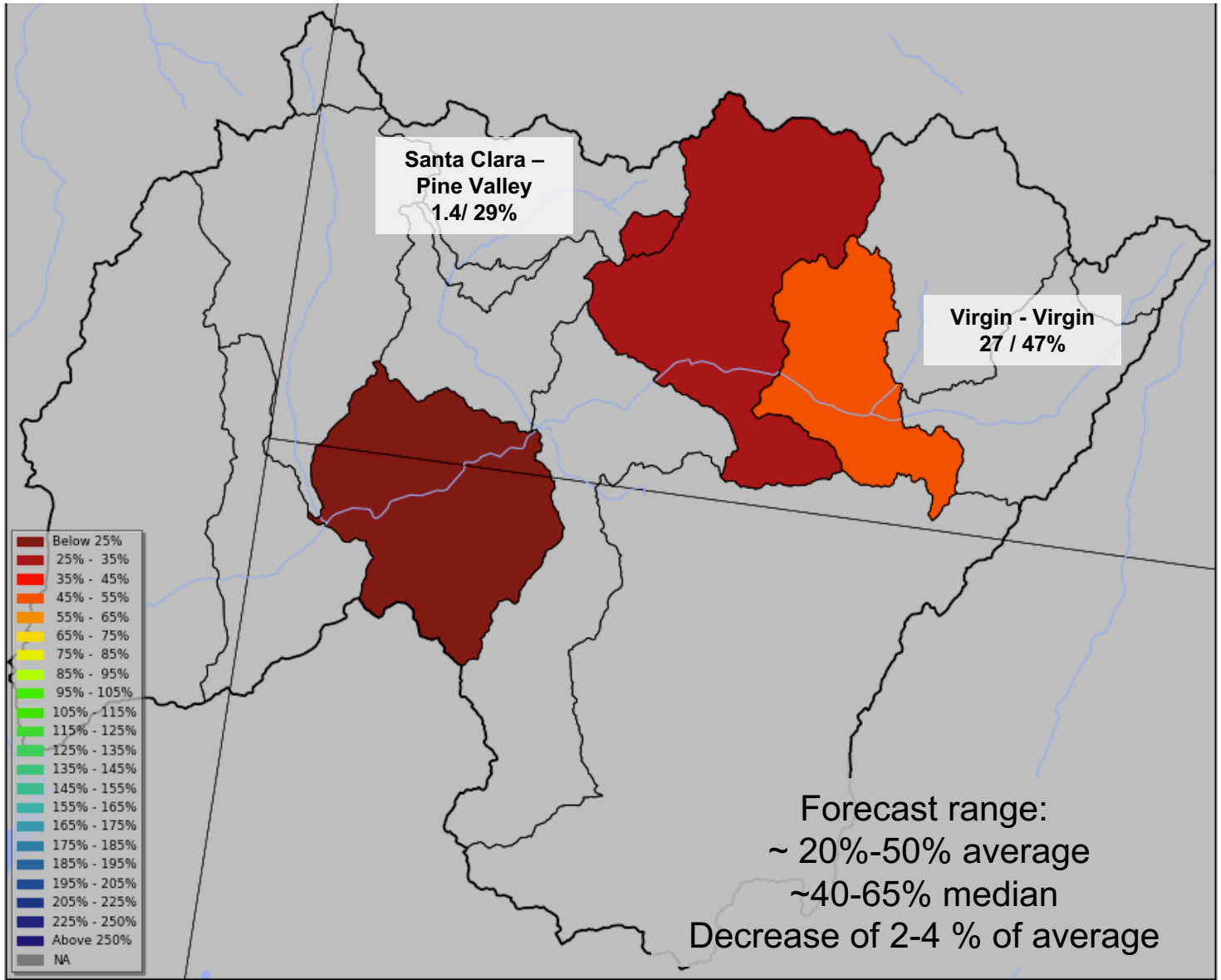
This chart available at: www.cbrfc.noaa.gov - water supply drop down menu - select: Upper Colorado Situational Awareness



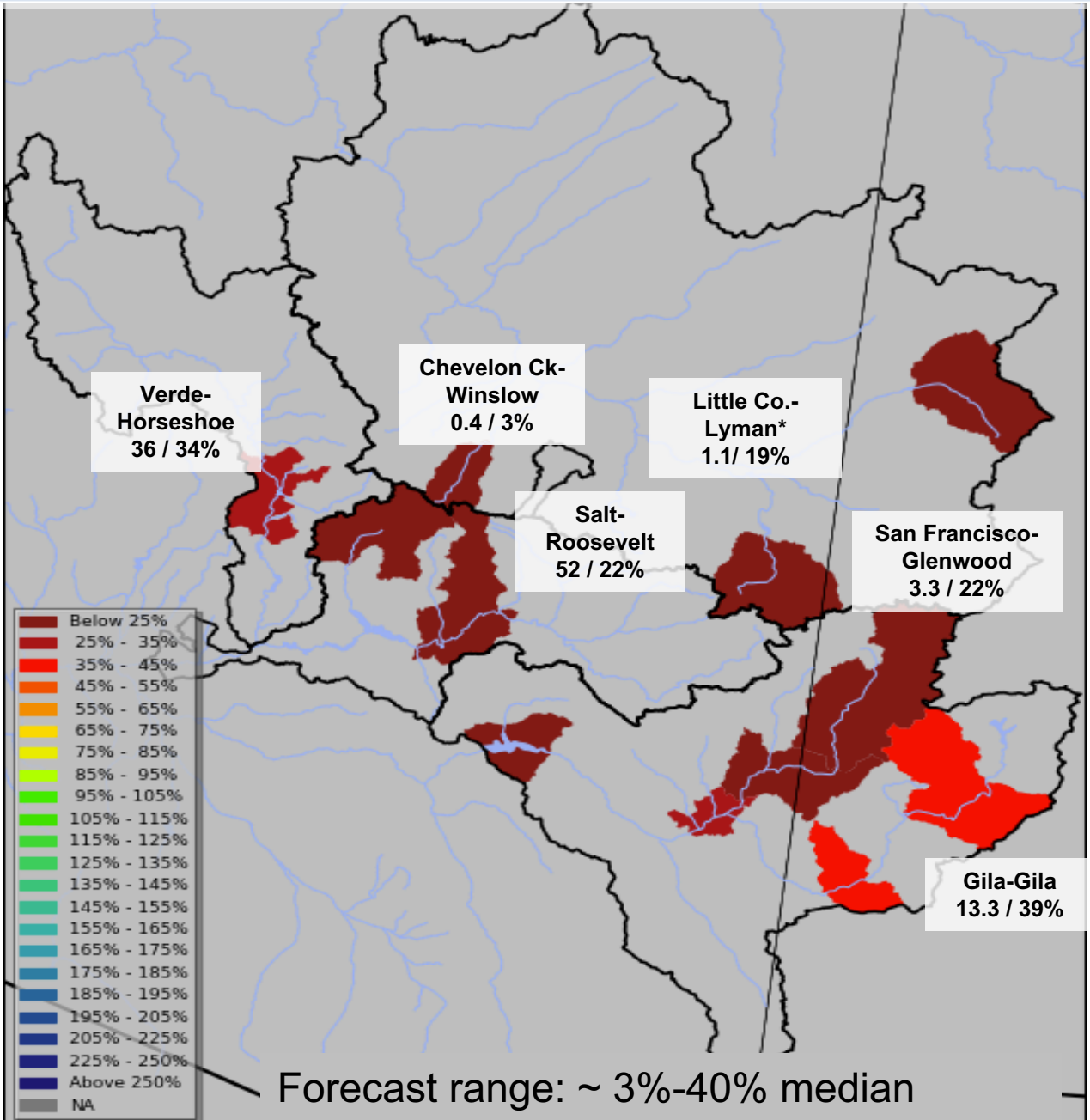
# Lower Colorado (Virgin River) April-July Streamflow Volume Forecasts

## Forecasts as of Mar 1 2018



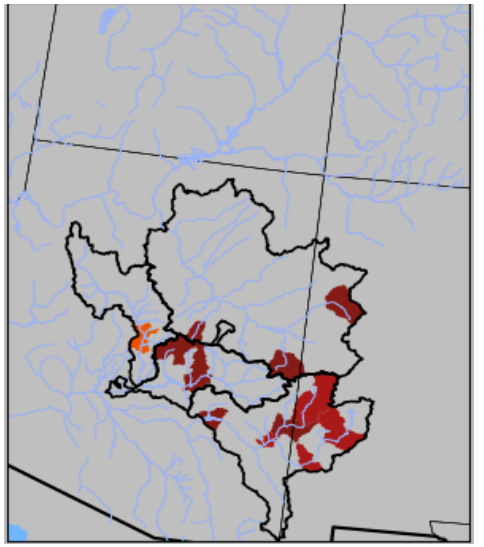


# Lower Colorado Mar-May forecast streamflow volumes (1000's acre-feet / % of 1981-2010 median)




Forecast range: ~ 3%-40% median

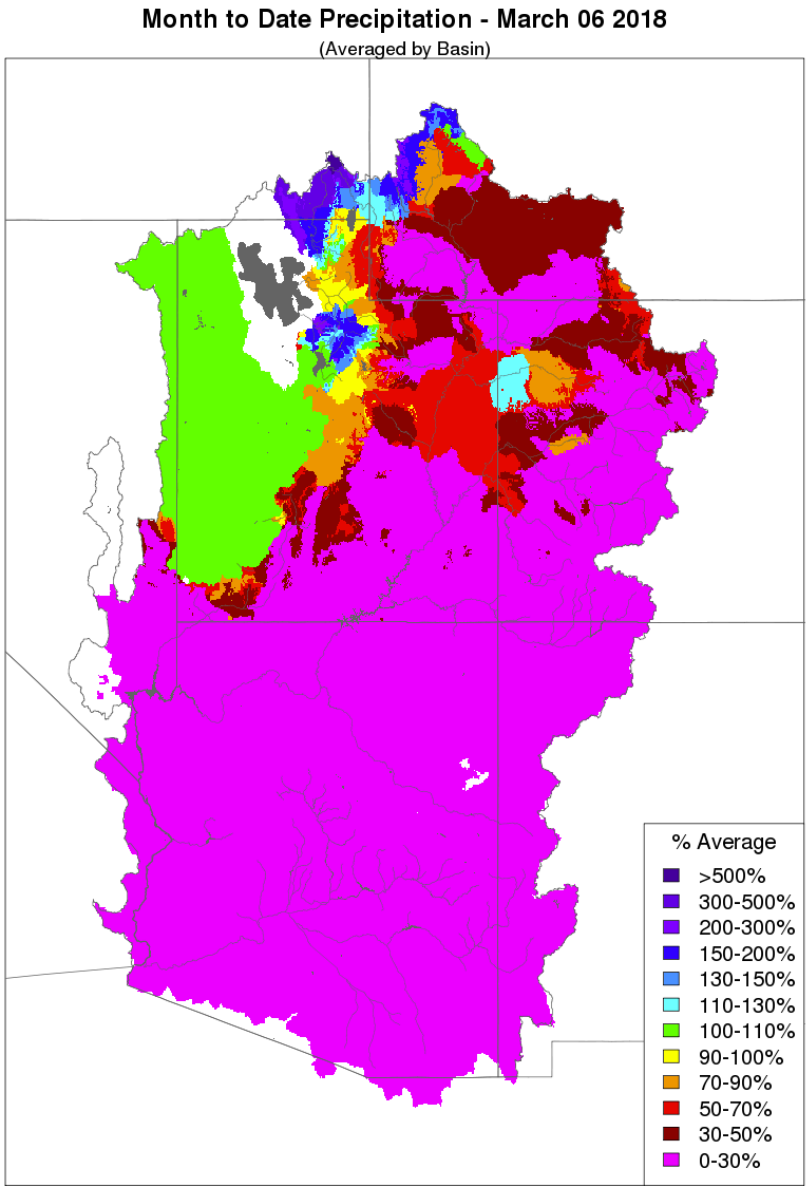
Forecasts as of
Mar 1 2018

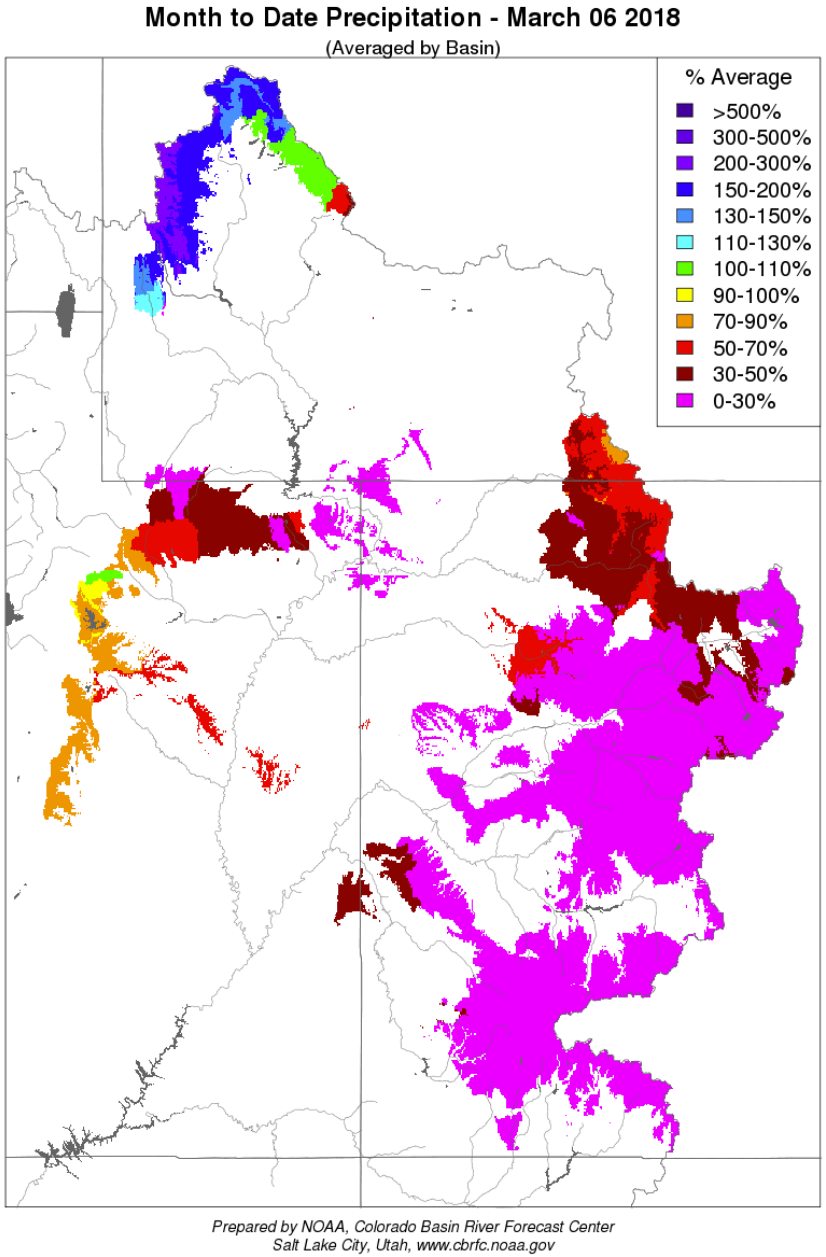


* Mar-June forecast period

# How are forecasts trending ??

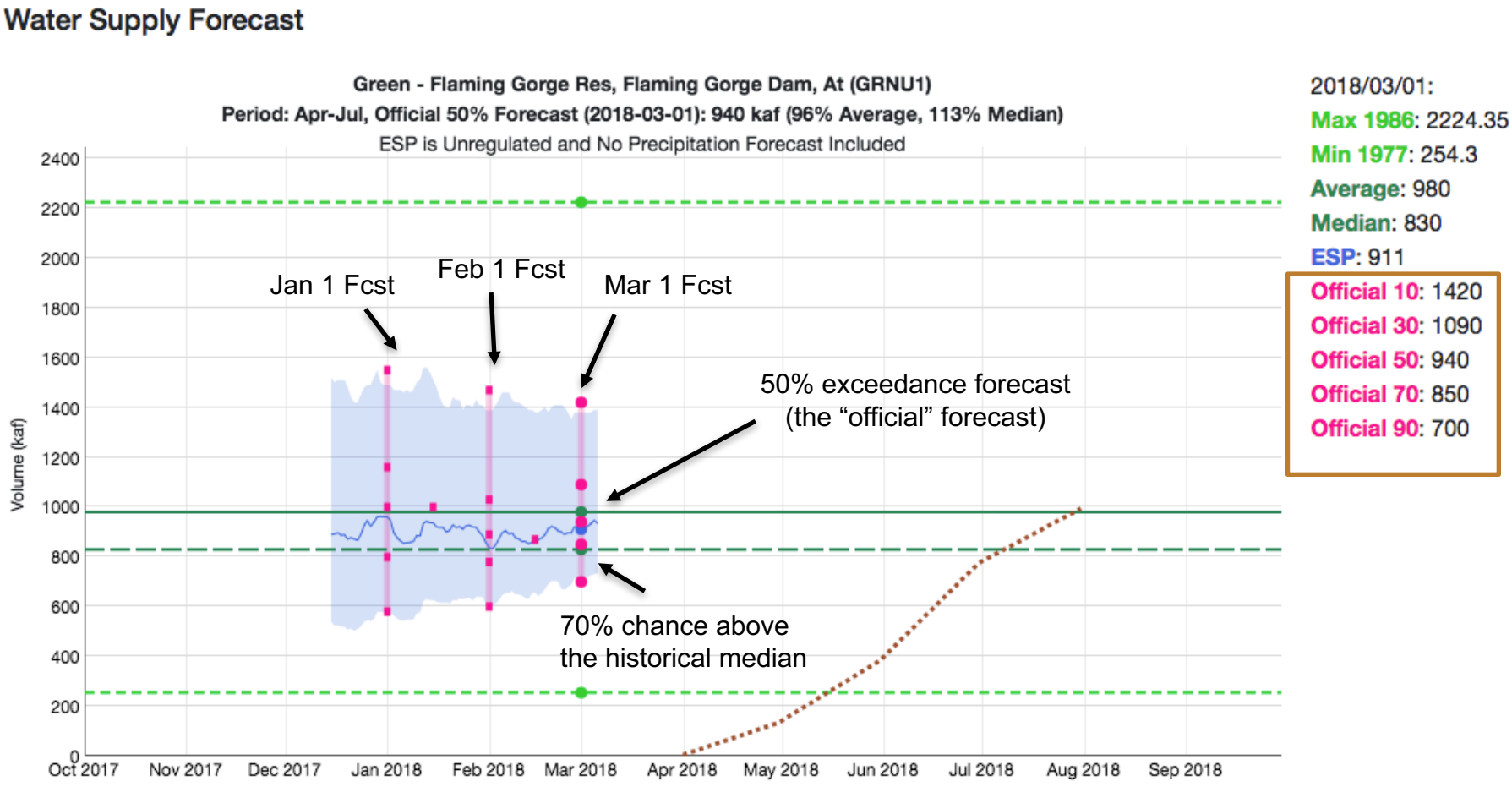
## March Precipitation (first 6 days)



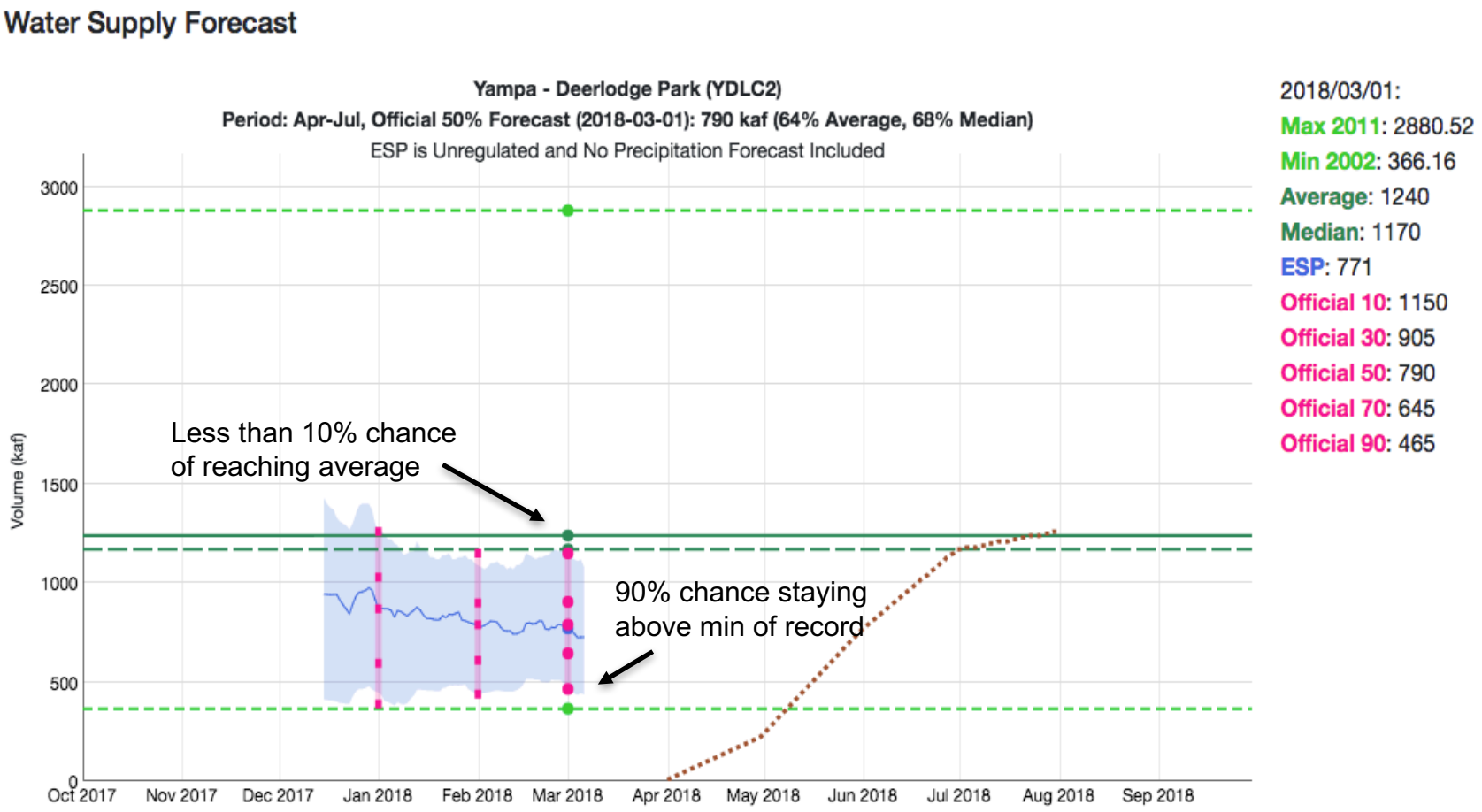
# Forecast Evolution Plot: Flaming Gorge Inflow

April-July Forecast: 96% of average



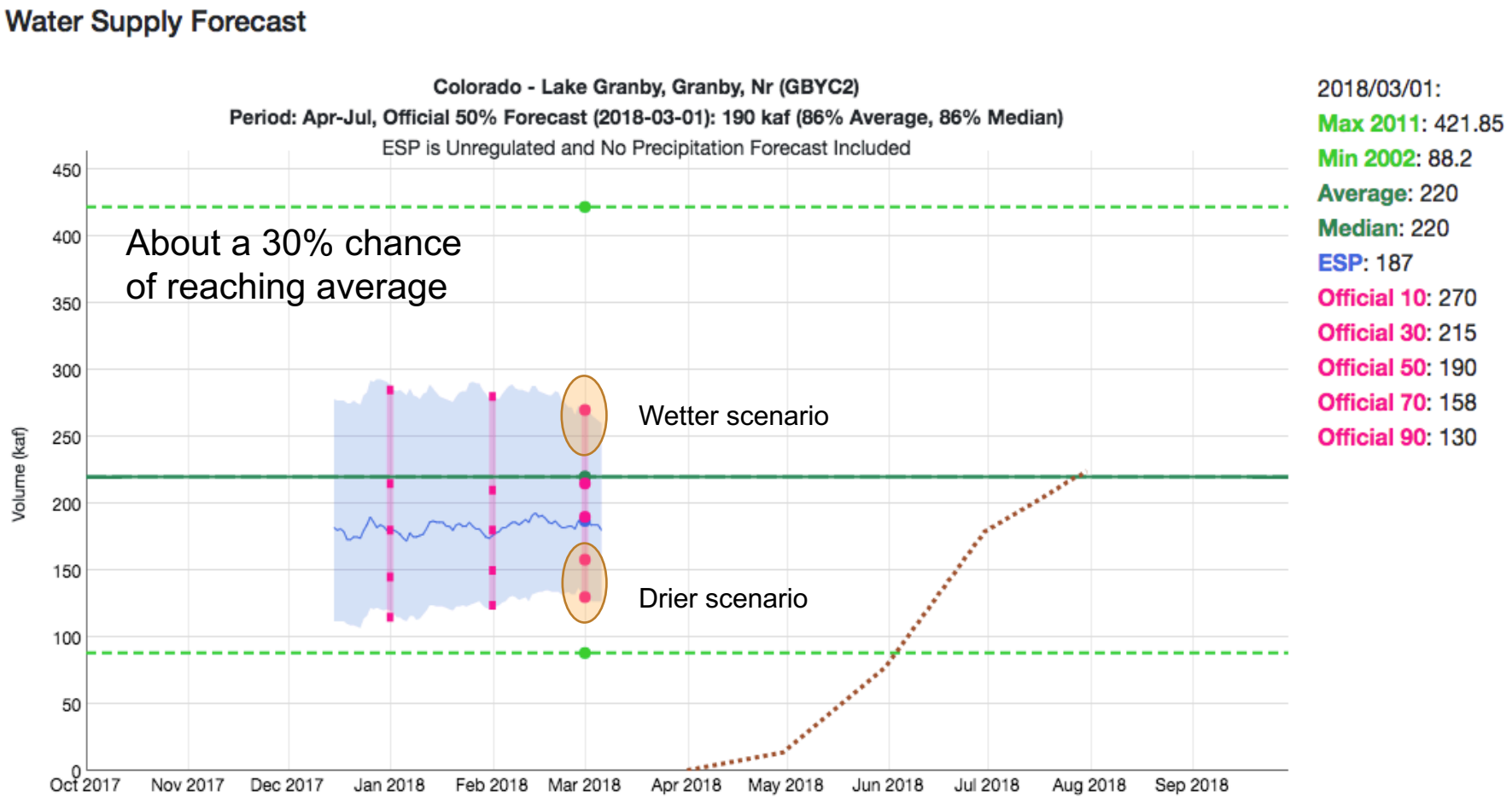
# Forecast Evolution Plot: Yampa River @ Deerlodge

April-July Forecast 64% of average



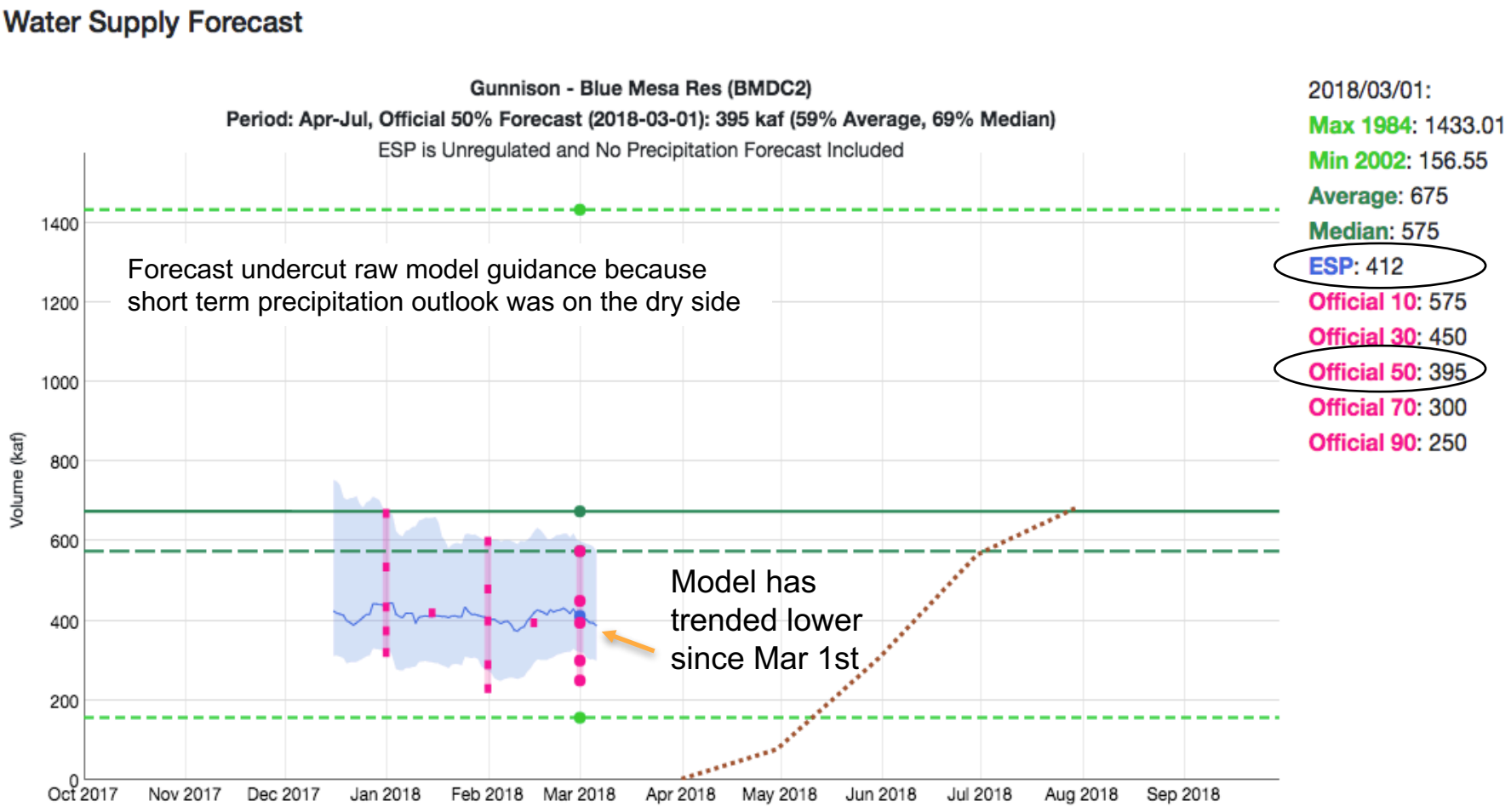
# Forecast Evolution Plot: Lake Granby Inflow

April-July Forecast 86% of average



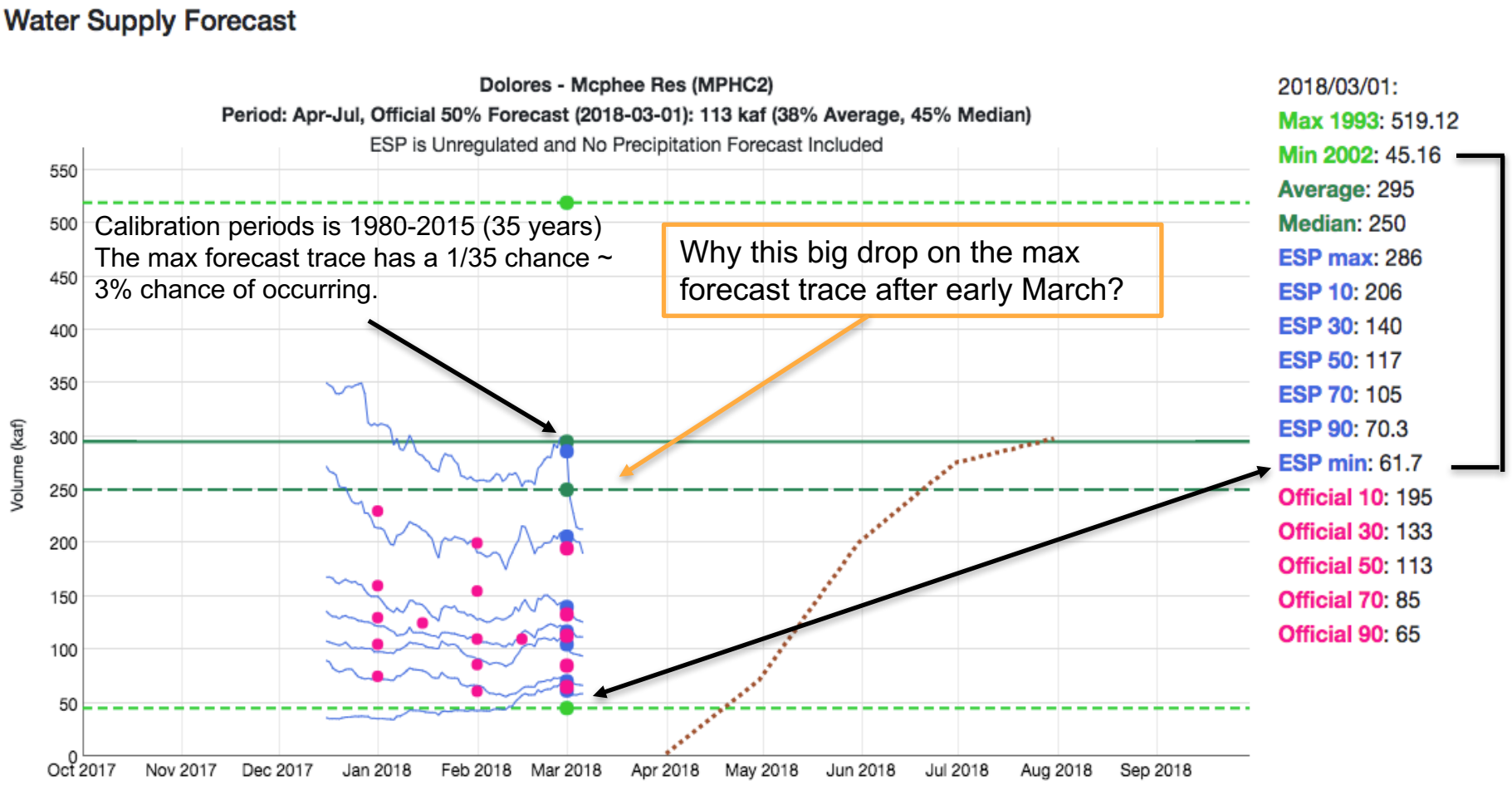
# Forecast Evolution Plot: Blue Mesa Reservoir Inflow

April-July Forecast 59% of average



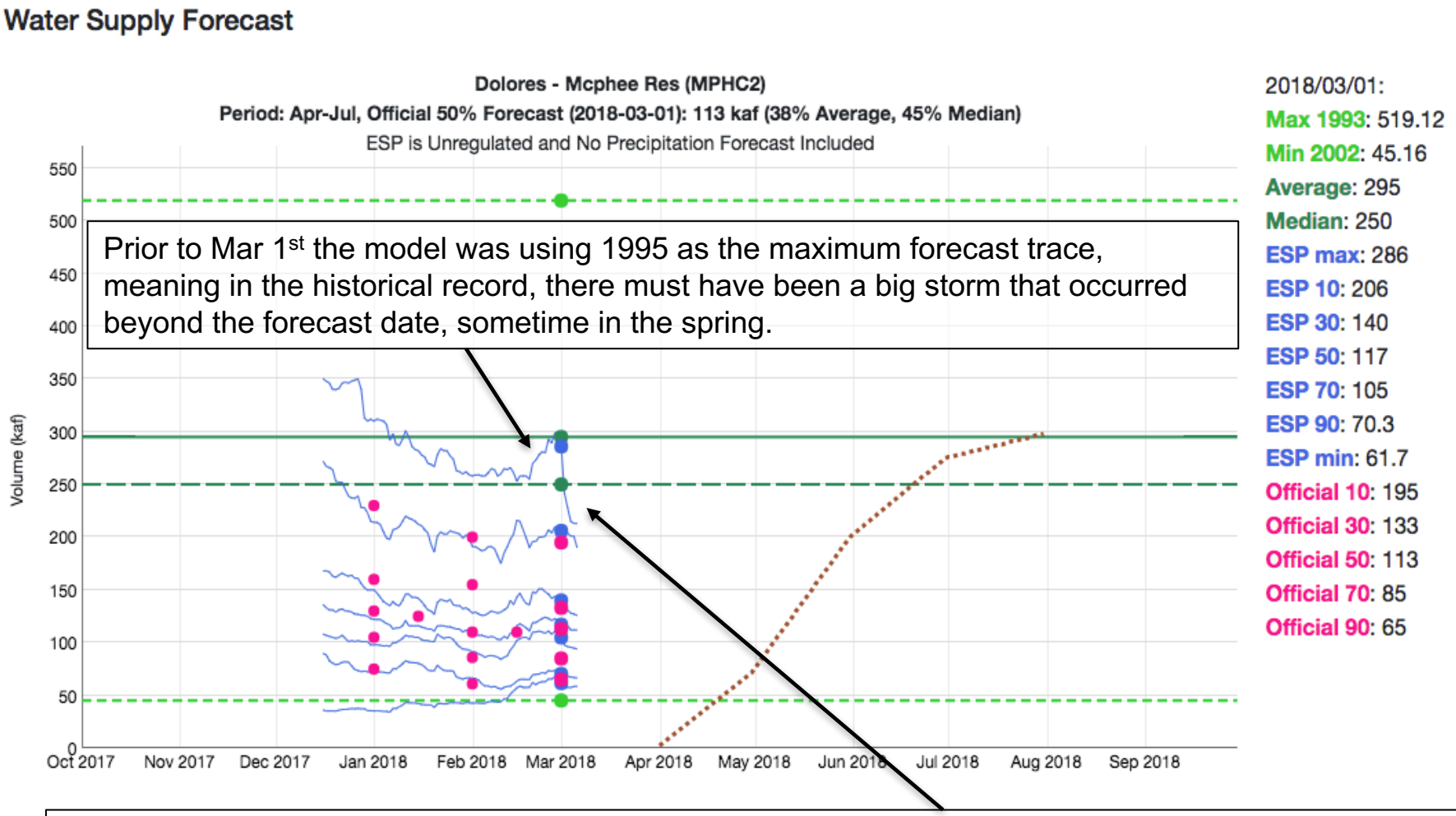
# Forecast Evolution Plot: McPhee Reservoir Inflow

April-July Forecast 38% of average



# Forecast Evolution Plot: McPhee Reservoir Inflow

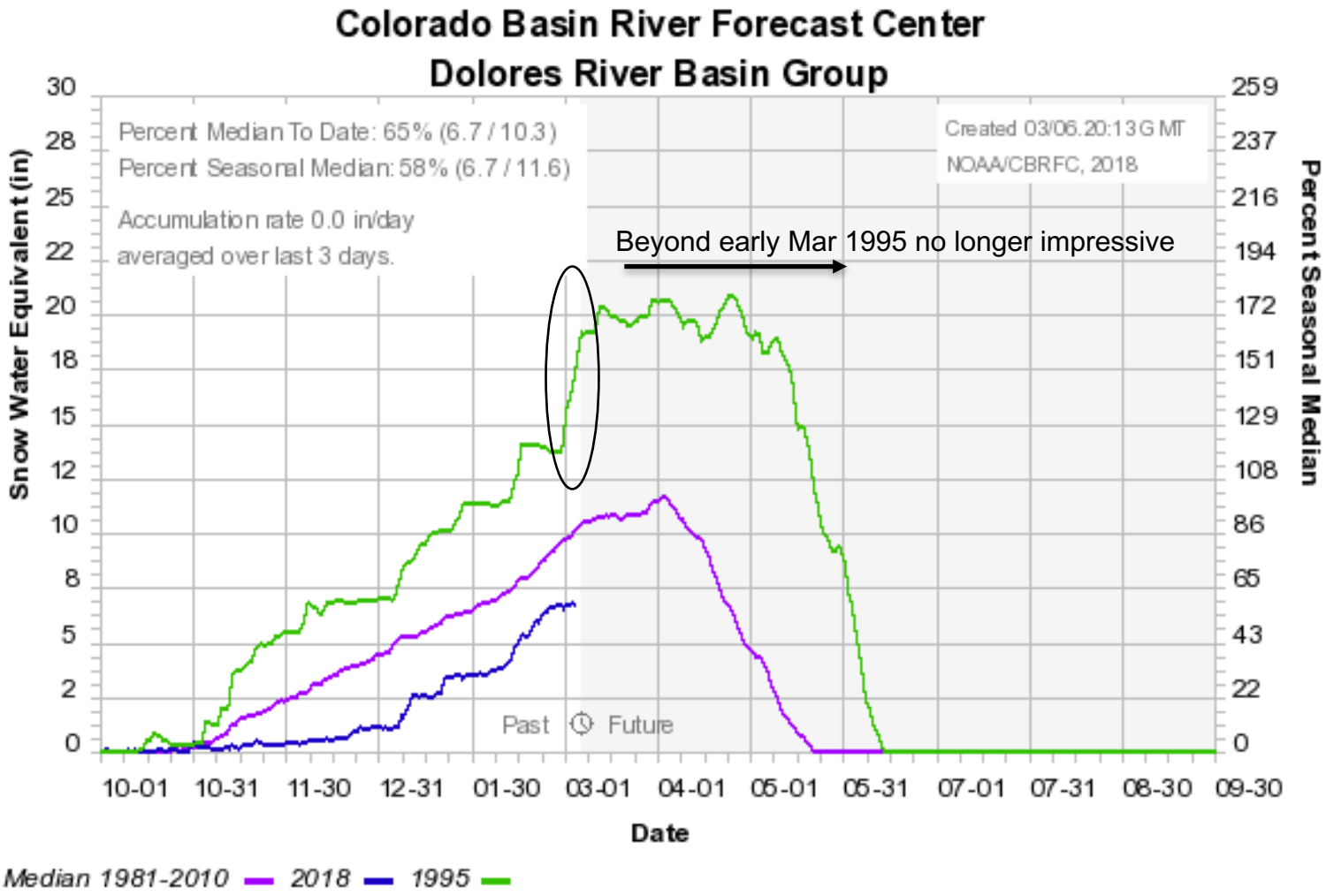
April-July Forecast 38% of average



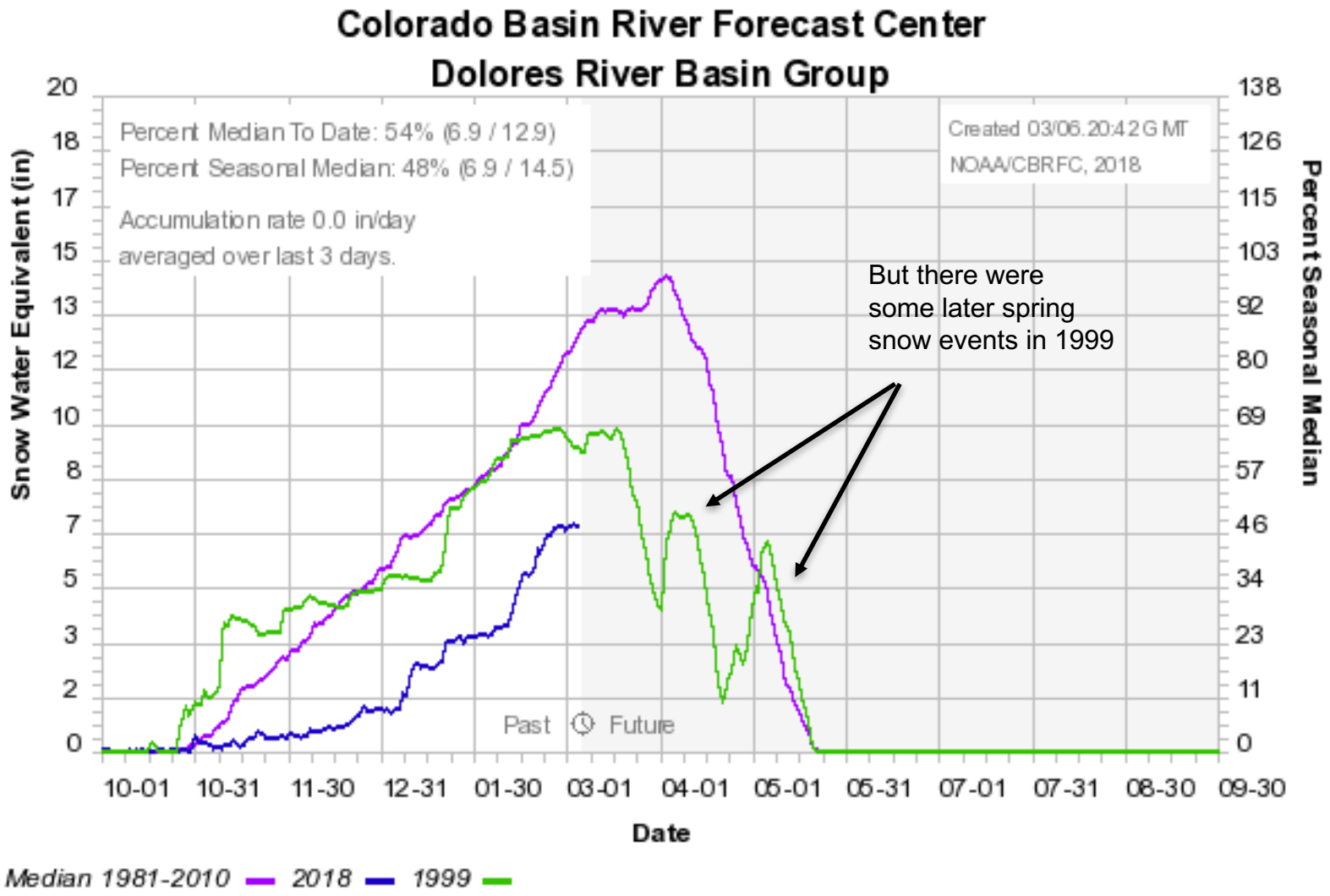

Prior to Mar 1st the model was using 1995 as the maximum forecast trace, meaning in the historical record, there must have been a big storm that occurred beyond the forecast date, sometime in the spring.

Beyond Mar 2nd the model started using a different year (1999) as the max forecast trace. So the storm must have occurred around late February or the first March 1995. Because as our forecast date advanced this storm no longer appeared in the historical record.

# Dolores Basin – Late Feb/Early Mar 1995 Event

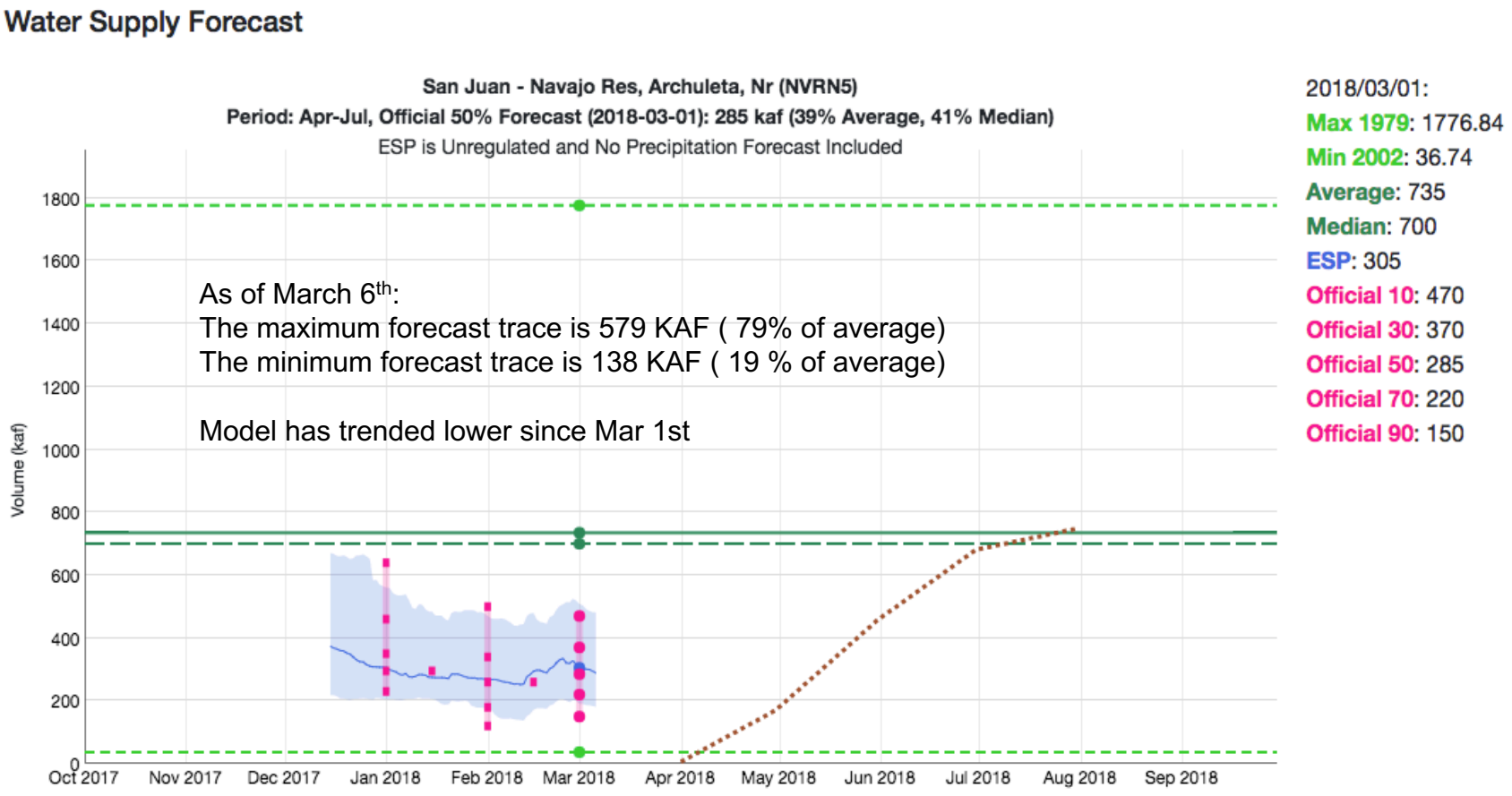


# Dolores Basin – Spring 1999 Events



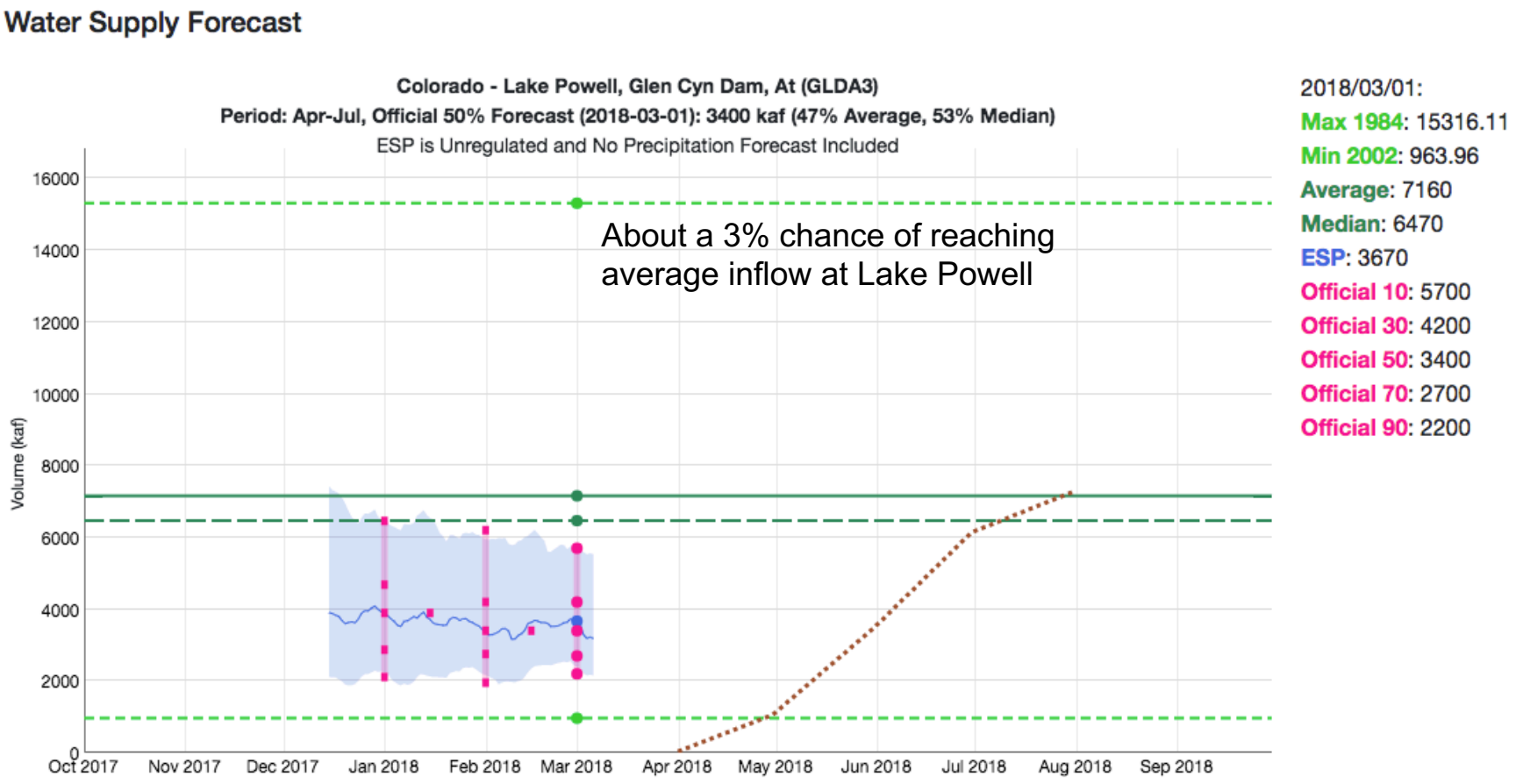
# Forecast Evolution Plot: Navajo Reservoir Inflow

April-July Forecast 39% of average



# Forecast Evolution Plot: Lake Powell Inflow

April-July Forecast 47% of average



# Forecast Validation: Historical model error improves February to March

## Historical Model Error 1981-2010

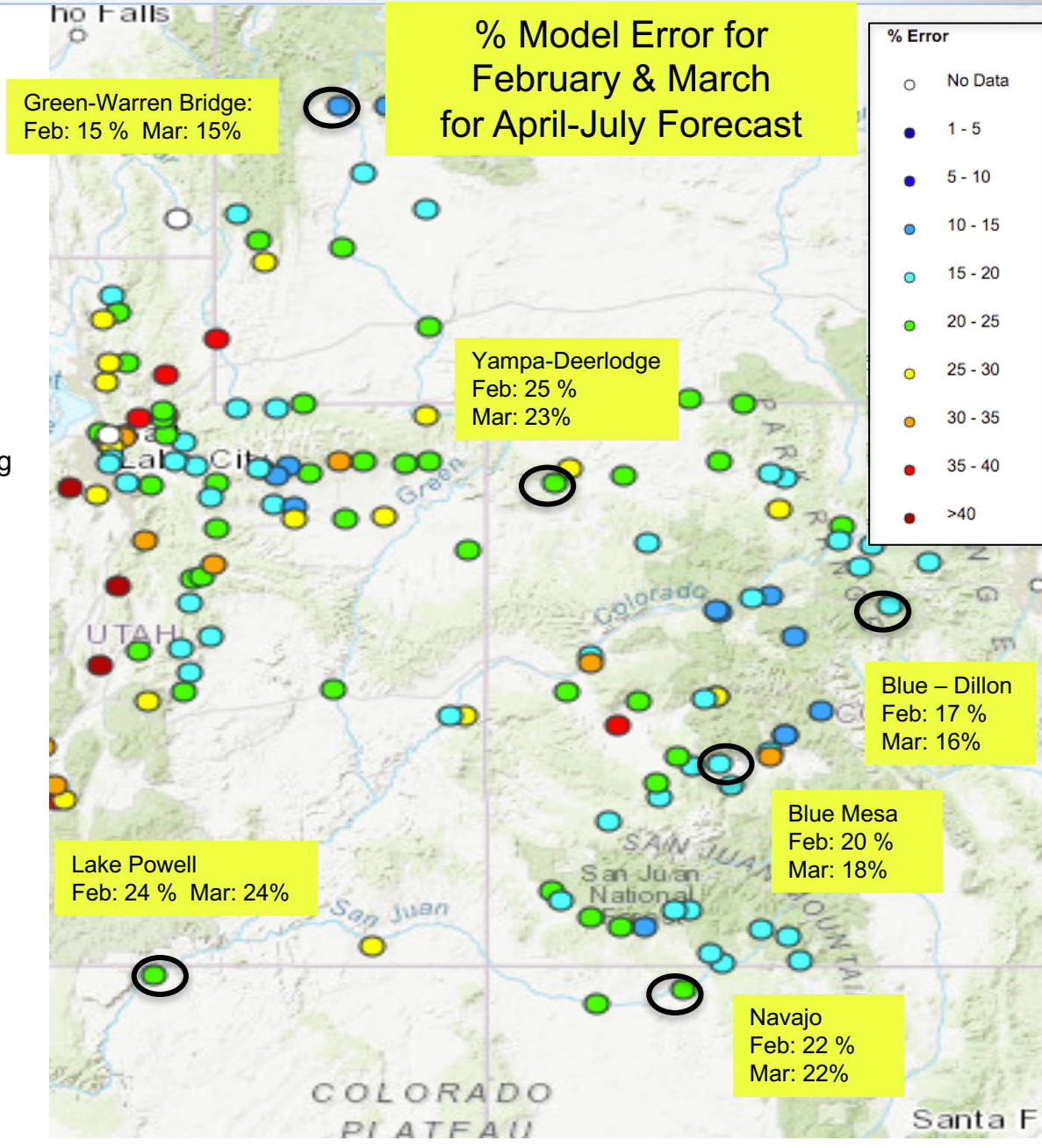
Some improvement between February and March but it is minimal for some sites. Biggest 2 month improvement tends to be from Mar to May.

Forecasts are better than just going with average

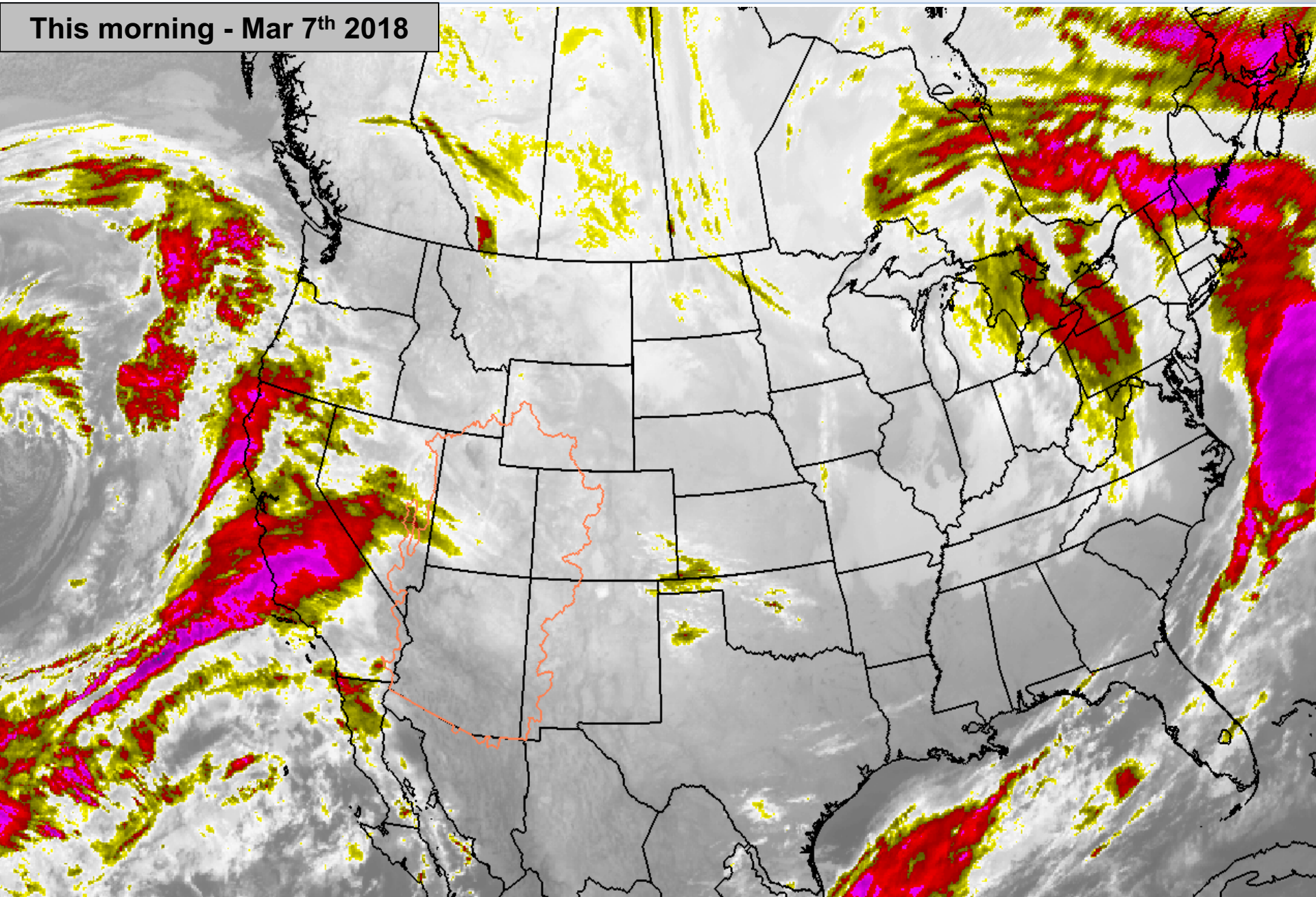
Error tends to decrease each month into the spring

Where We Do Better:
- Headwaters
- Primarily snow melt basins
- Known diversions / demands

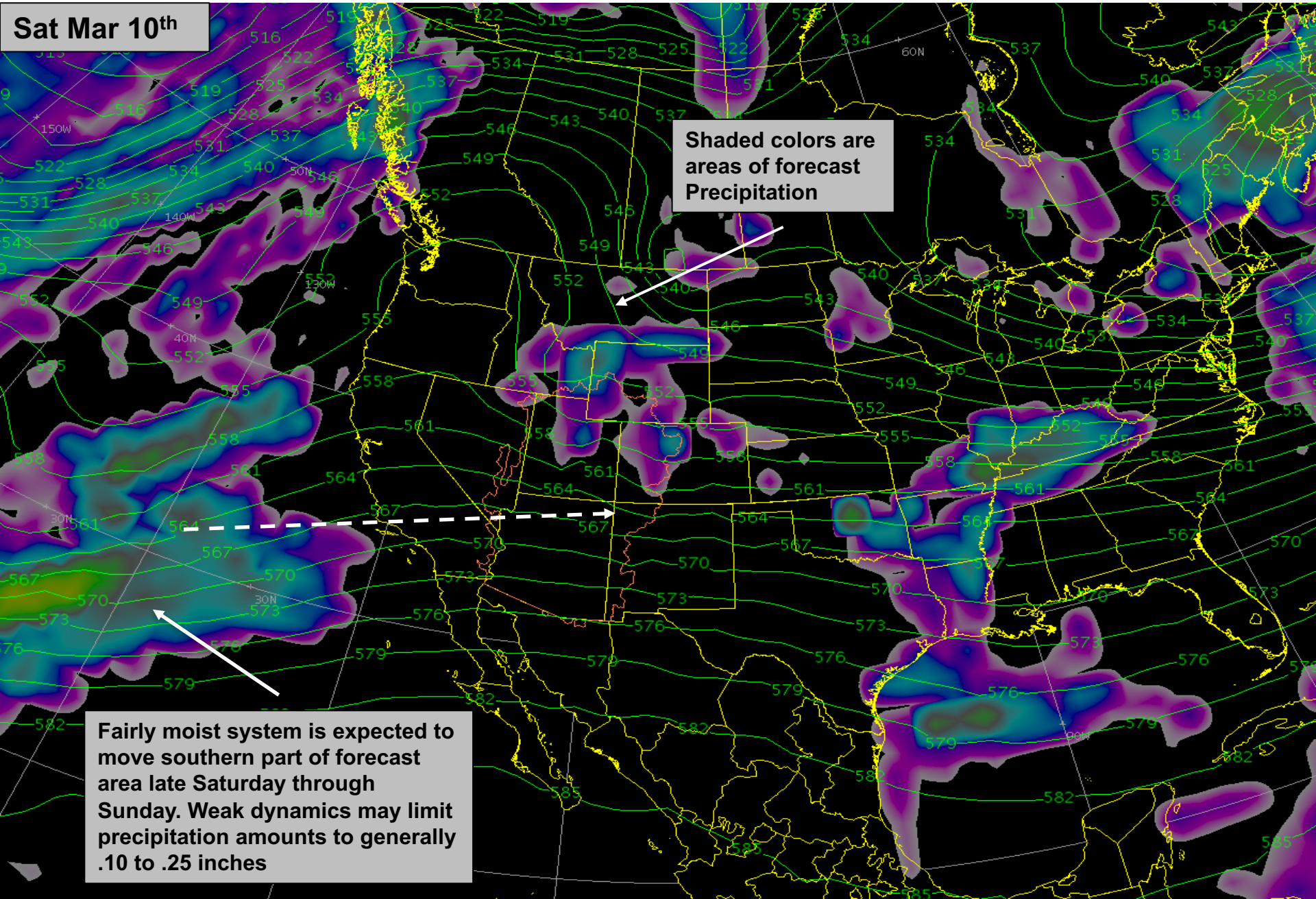
Where We Do Worse:
- Lower elevations (rain or early melt)
- Downstream of diversions / irrigation
- Little is known about diversions / demands



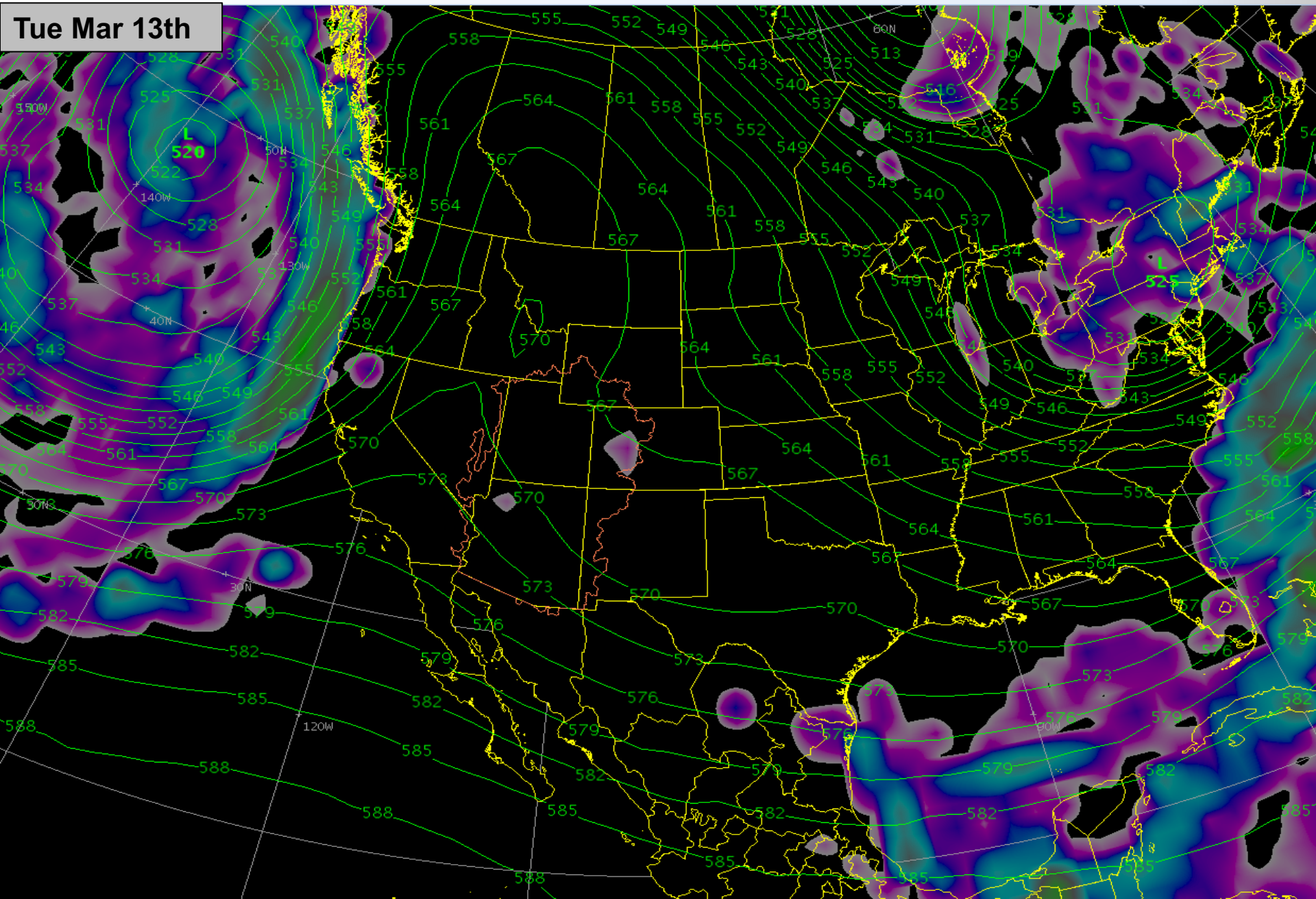
Current and Future weather – High pressure ridge currently over the area with dry conditions in the near term



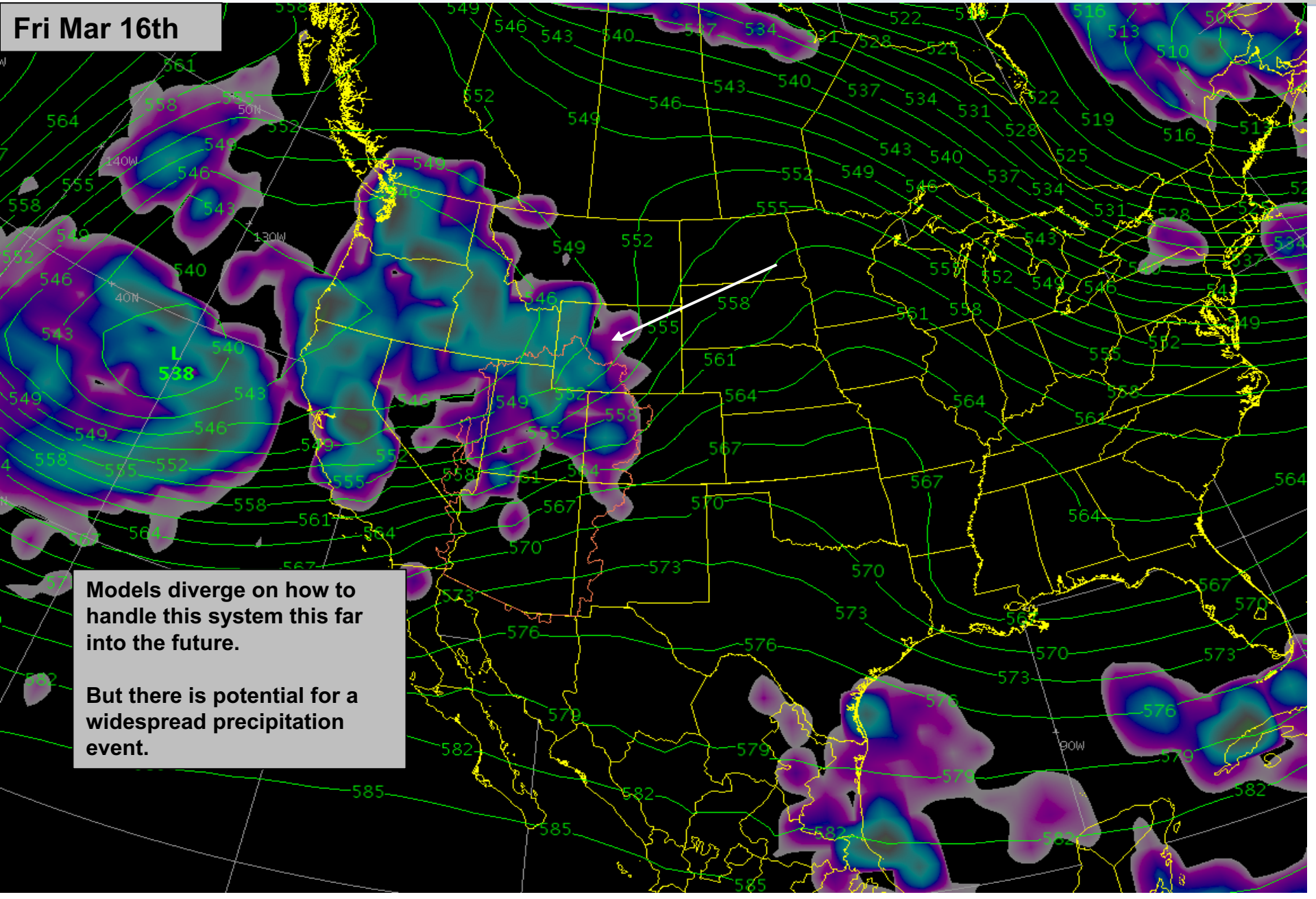
Upcoming Weather: Very weak system moving through the mean ridge may bring light precipitation to parts of the upper Green and Yampa Basins. Insignificant amounts.



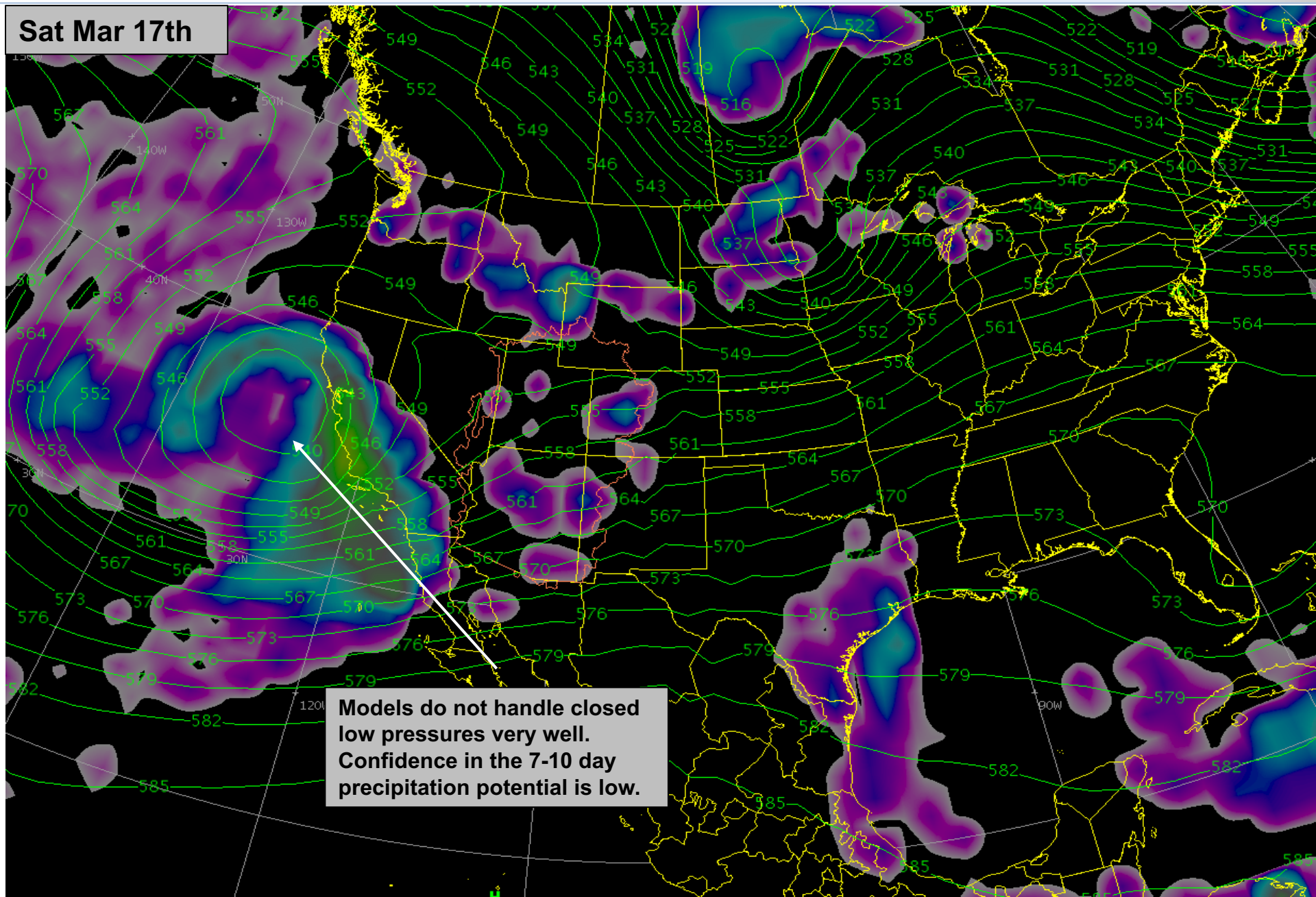
Upcoming Weather: High pressure ridge centered over the area resulting in dry conditions and above normal temperatures.



Upcoming Weather: The next best chance for precipitation as moisture kicks inland from the Low pressure system off the west coast. Confidence is low

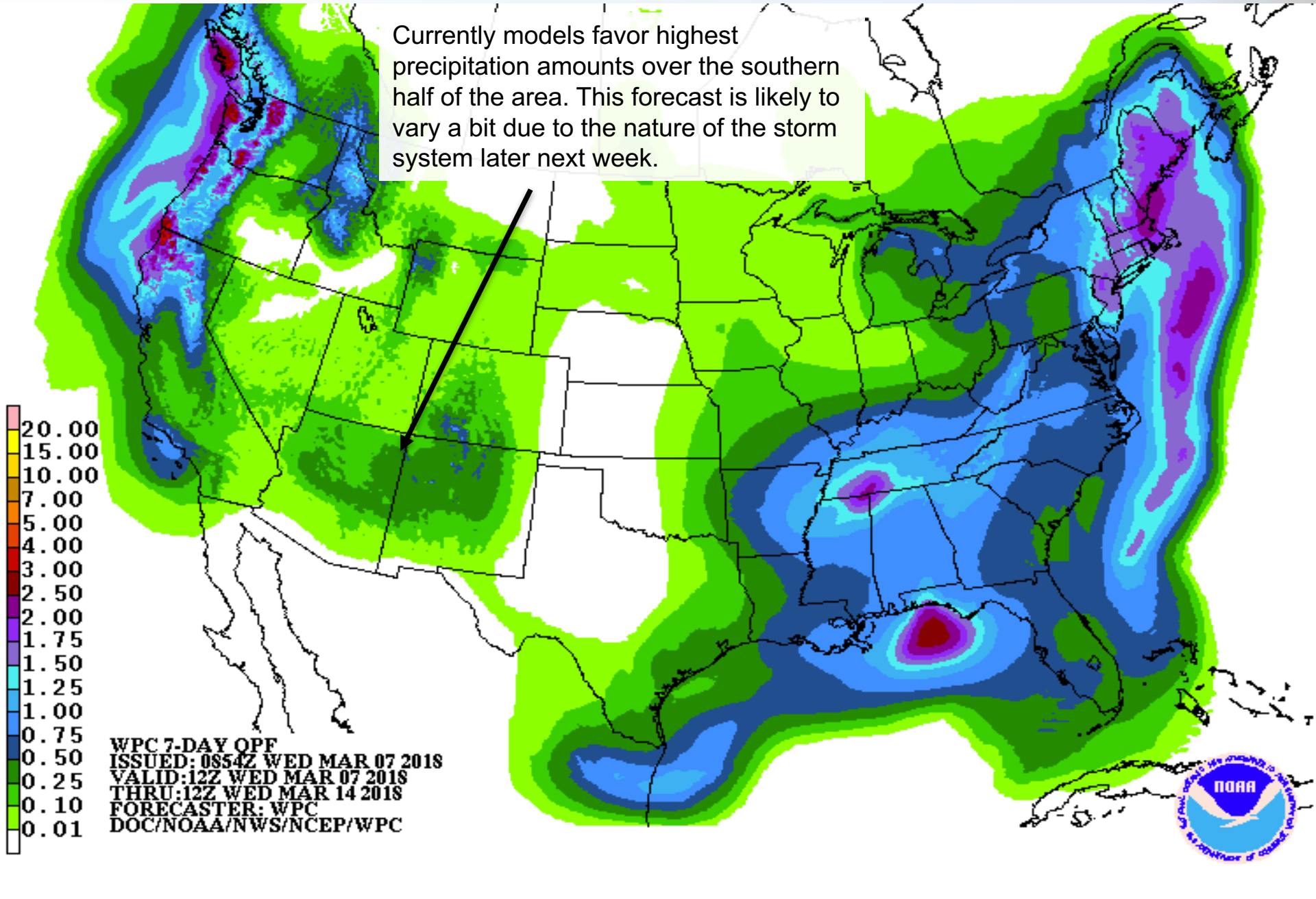


Upcoming Weather: Does the closed low linger off the coast? Move inland ? Tap subtropical moisture? Weaken and move through as an open wave ? Many implications.



# Upcoming Weather

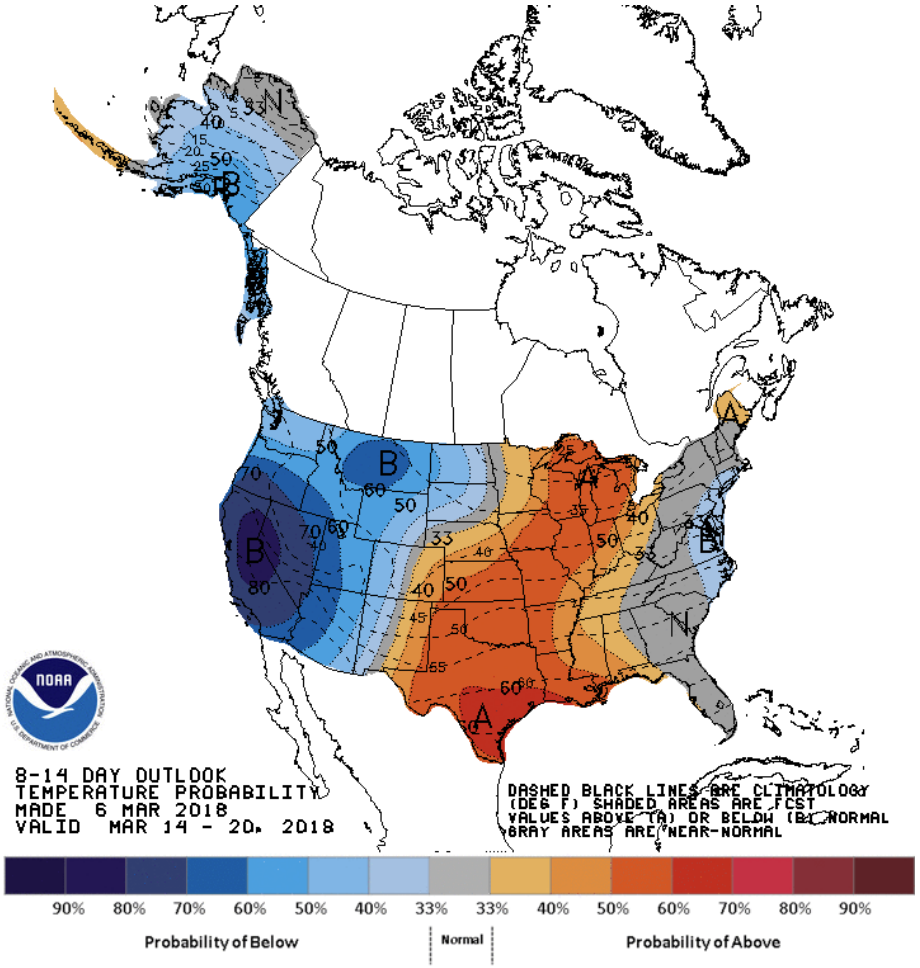
## NWS Weather Prediction Center: Precipitation Forecast Mar 7 – Mar 14



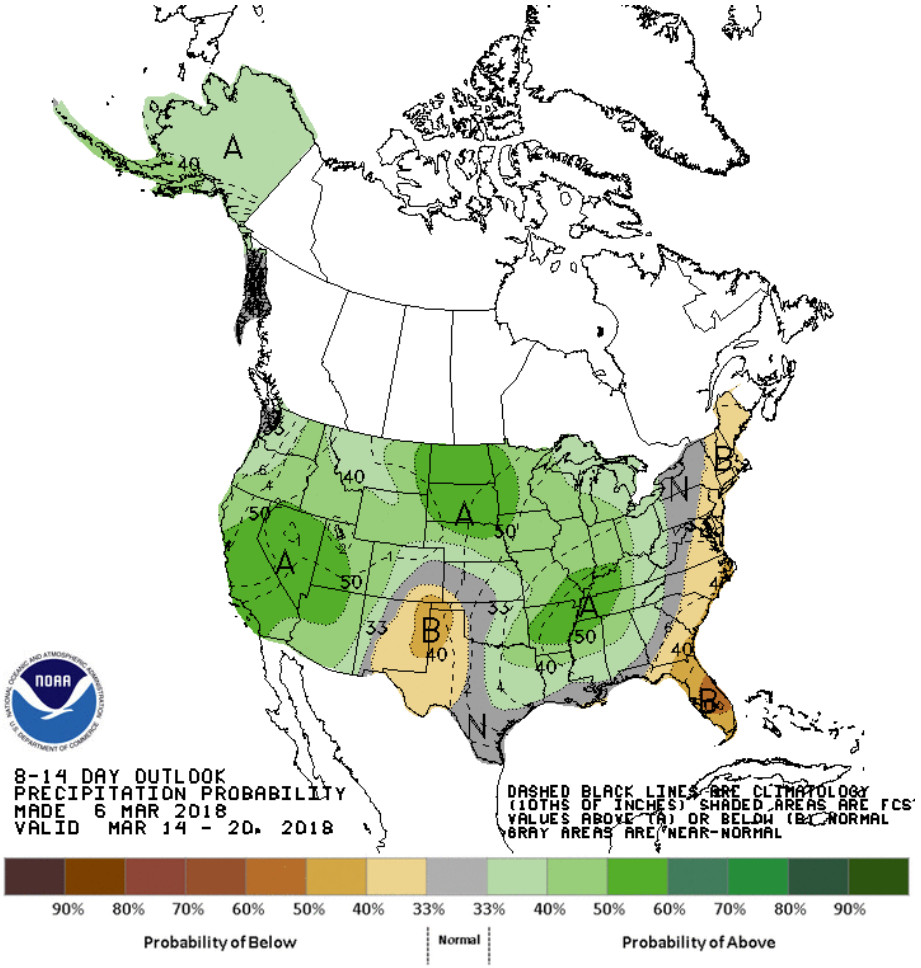
# Upcoming Weather and Impacts to Water Supply Forecasts

## NWS Climate Prediction Center: Temperatures & Precipitation probability Mar 14 - Mar 20

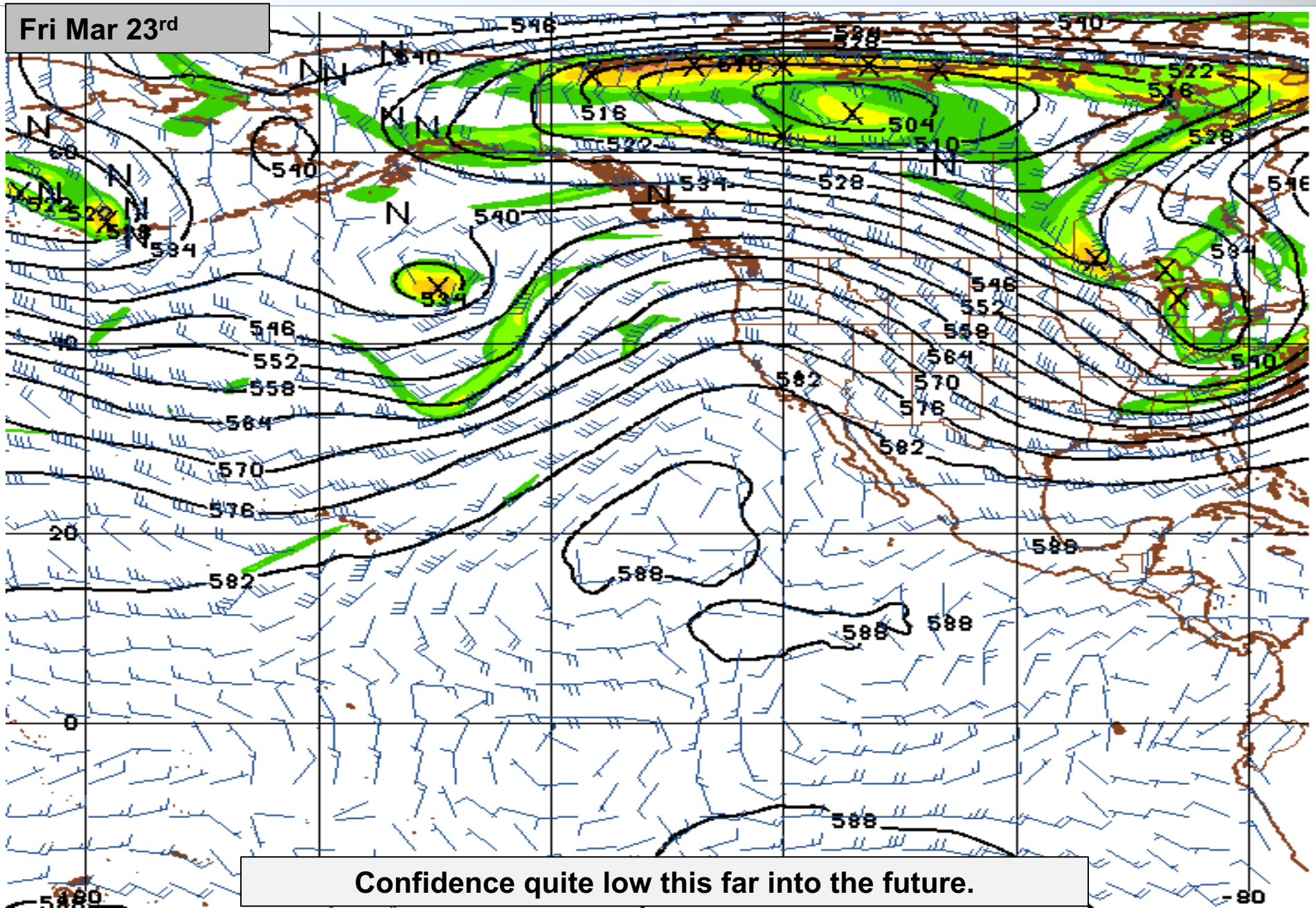
### Temperature Probabilities




### Precipitation Probabilities



Long Range Weather Outlook: This model suggest warmer/dryer the last week of March. Zonal flow component across the Pacific Ocean so pattern may remain progressive.



# Key Points

Several areas in the upper Colorado River Basin received near to above average precipitation in February. For southwest Colorado it was the first time in several months.

While there were some minor snowpack improvements conditions remain quite poor with the exception of the Green River Basin headwaters in Wyoming and headwaters of the Colorado Mainstem.

Forecasts increased in the Green River headwaters above Fontenelle Reservoir, increased slightly in the San Juan above Navajo Reservoir, decreased in the Duchesne, and changed little elsewhere. Lake Powell remained at 3.4 MAF or 47% of average.

On average the snow accumulation season runs into mid to late April in most runoff producing areas. As we get further into spring significant snow accumulation while possible, becomes much less likely. Especially true for southern Basins (San Juan, Dolores, Gunnison). March into early April can be a pivotal time period.

The first half of March is probably going to end up with precipitation below average. This may result in a decreasing trend in forecast guidance with the mid-month update. There potential for additional precipitation starting about mid March.

# 2018 water supply briefing schedule

**2018 monthly water supply briefings for the Colorado Basin**

**Thursday Apr 5th @ 11 am MT**

**Monday May 7th @ 11 am MT**

**Great Basin/Utah webinars are same dates at 1:30 pm MT (there is one today)**

**Peak flow briefing Tues March 13th at 11 am MDT**

**Date/Times are subject to change. All registration information has been posted to the CBRFC web page.**

# CBRFC Water Supply Contacts

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