Colorado Basin Water Supply Briefing

May 7 2018

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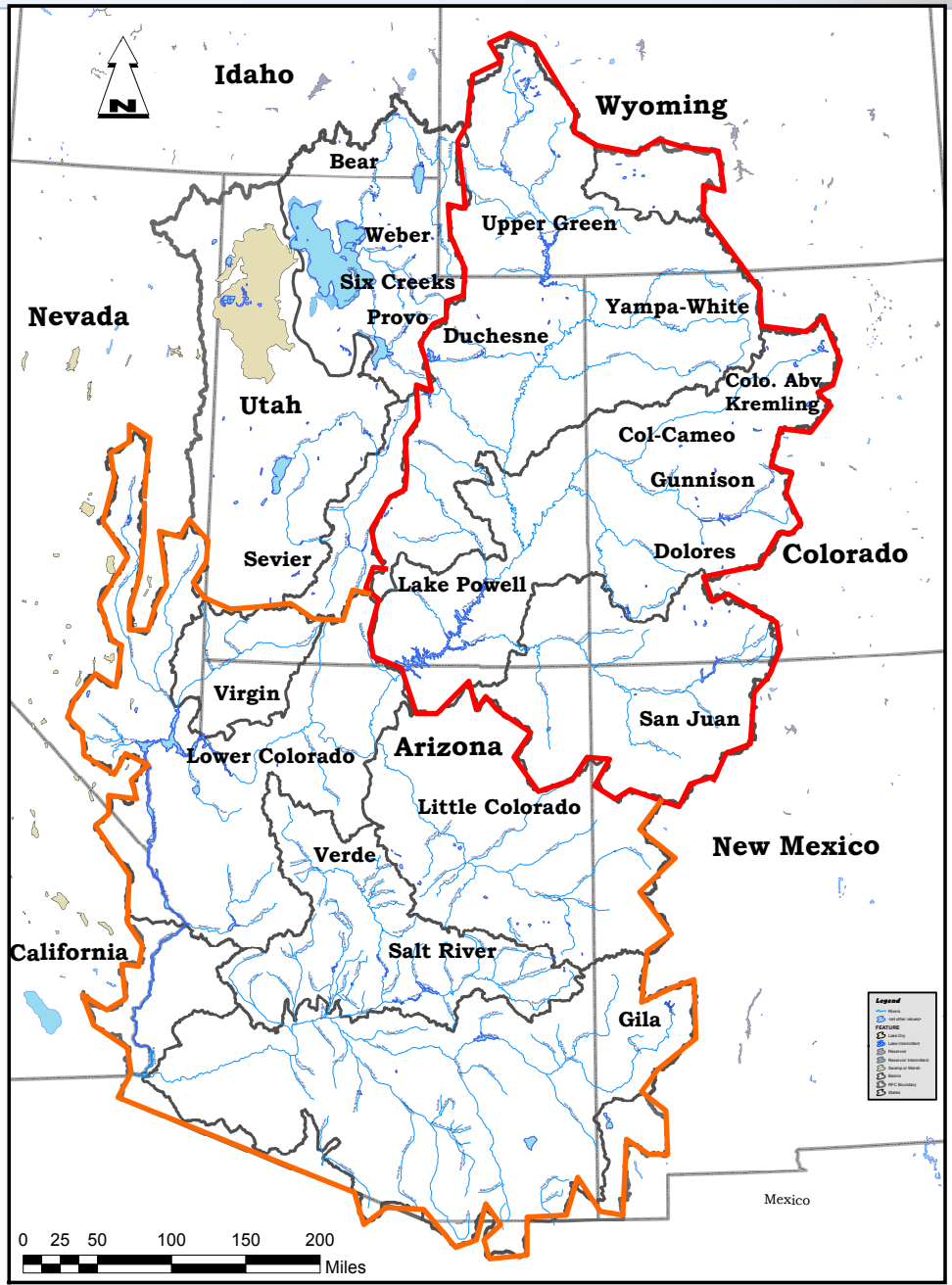
Please mute your phone until the question period

CBRFC Forecast Areas



Today's Presentation

The pattern that put us in our current situation – We were concerned last fall.

How April weather and the water year precipitation played out.

The 2018 snowpack evolution

Latest forecasts and how several rank historically.

Current and near term weather impacts
Seasonal peaks are very near – They are low and early.

We're in the active runoff period – what is our focus now ?

Wrapping up the 2018 season

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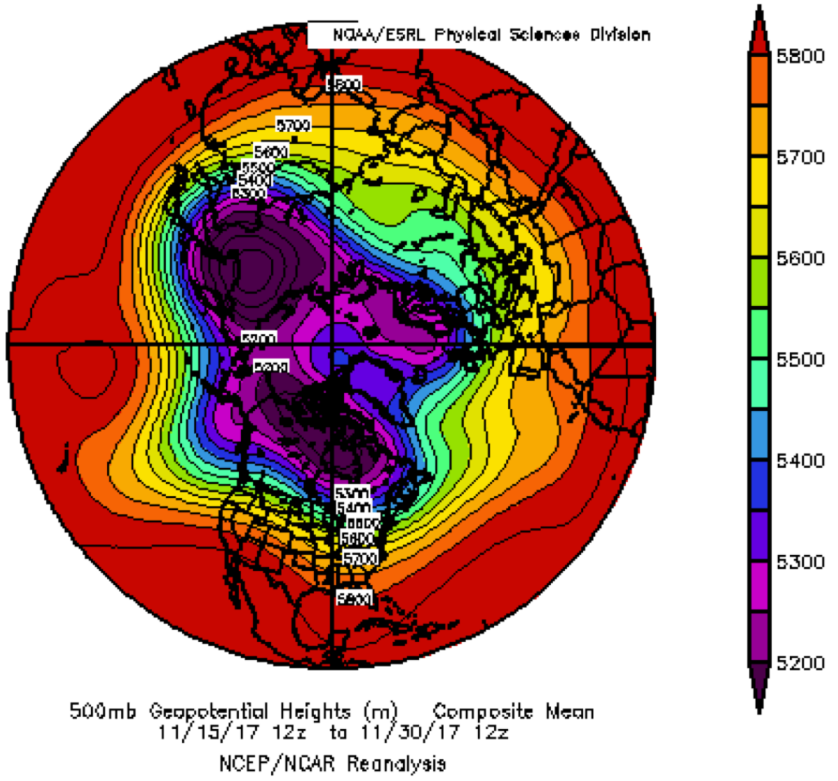
We knew we might have a problem late last fall
We anticipated water supply forecasts would start out low

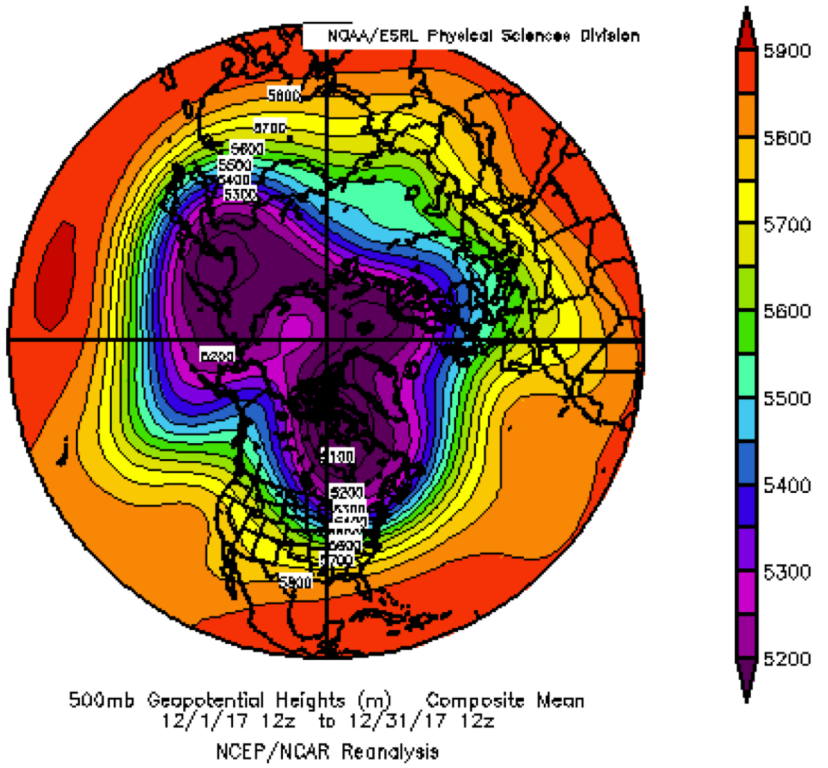
Strong low pressure in the east (Hudson Bay) and a strong ridge near the West Coast.
A high amplitude “Blocking Pattern” had become established by December.

Extended periods of dry & warm or cold & wet usually result with such patterns.

Mean Atmospheric Pattern
Nov 15 – Nov 30

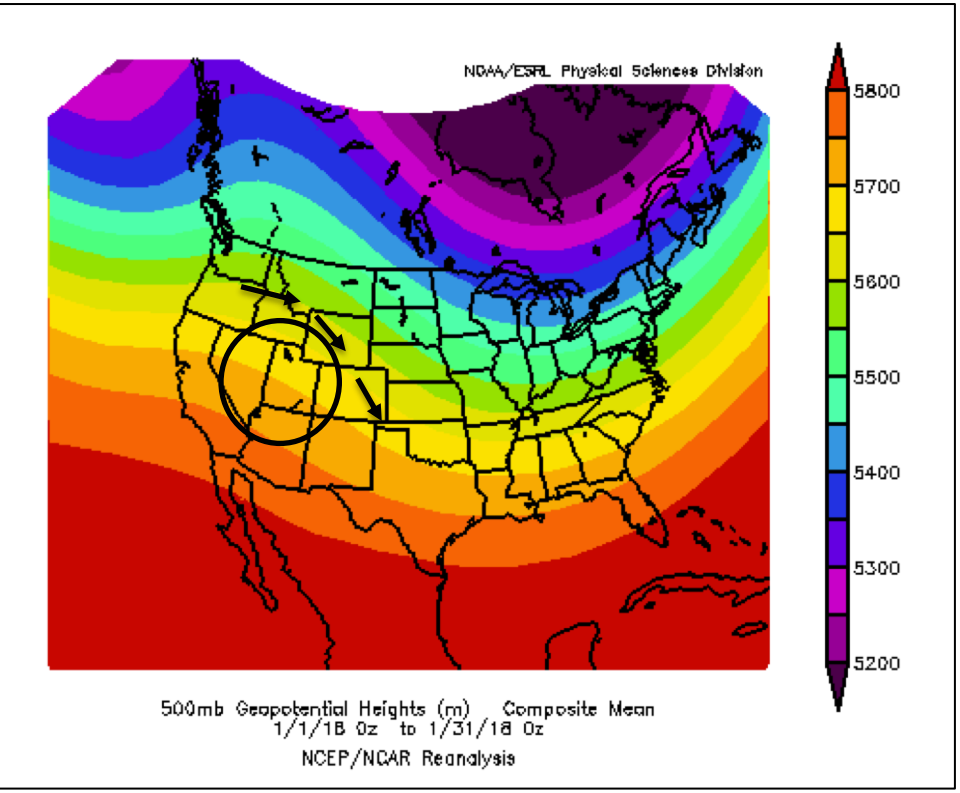


Mean Atmospheric Pattern
Dec 1 – Dec 31

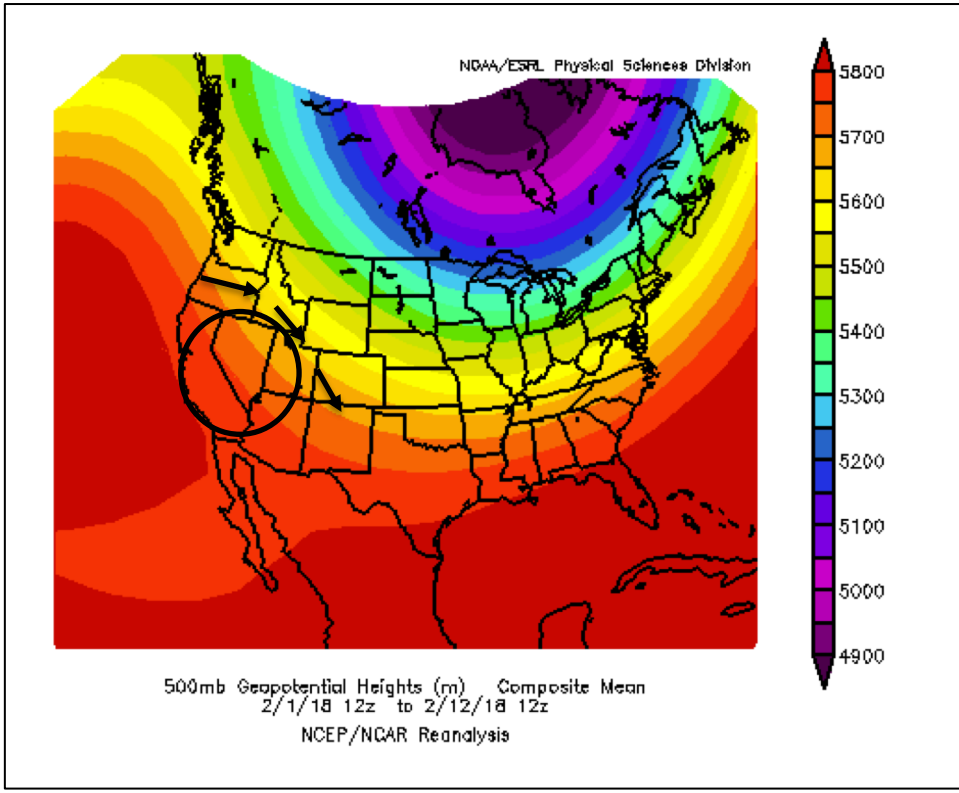


This weather pattern persisted into mid February

Mean Atmospheric Pattern
January 2018

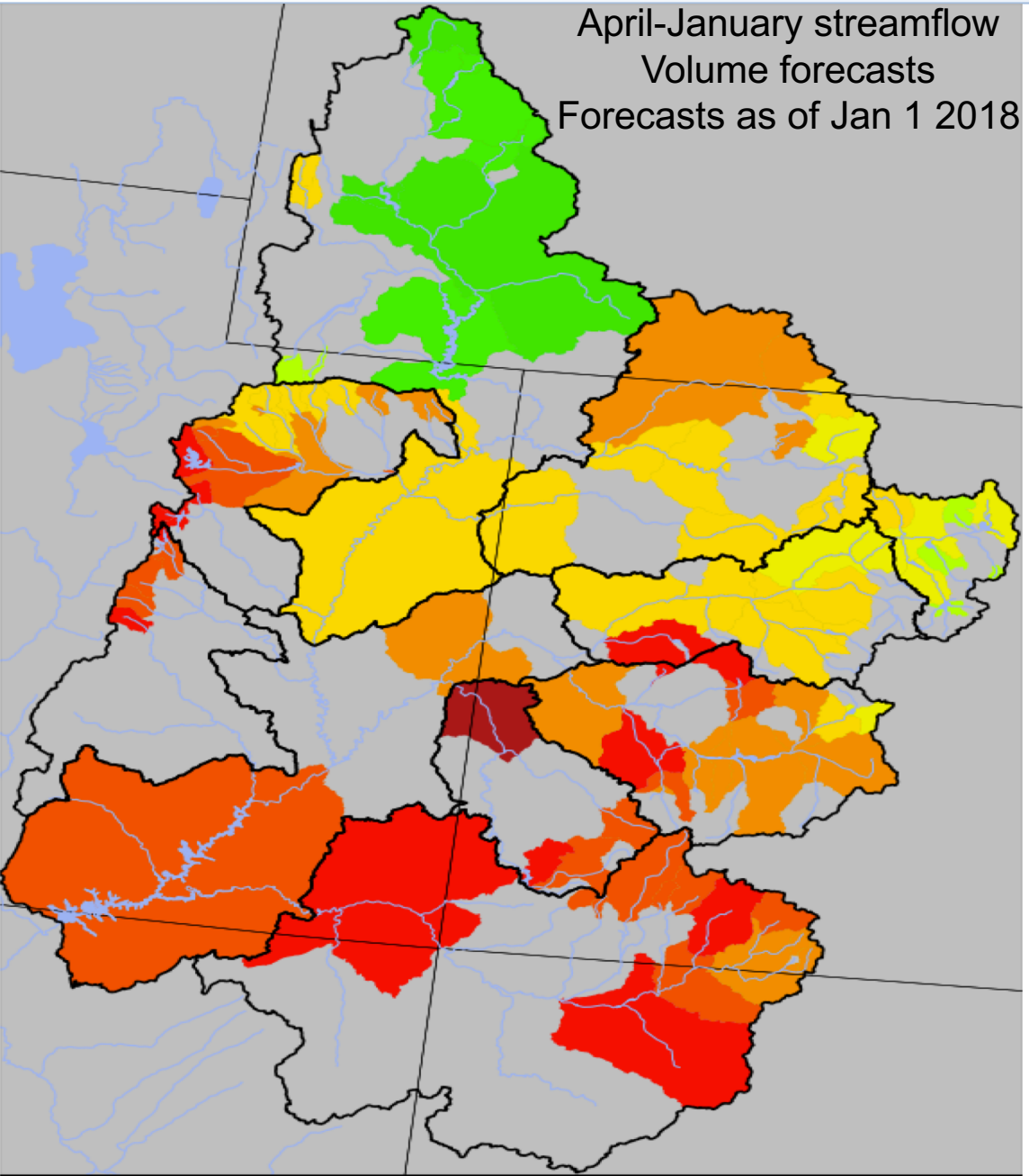


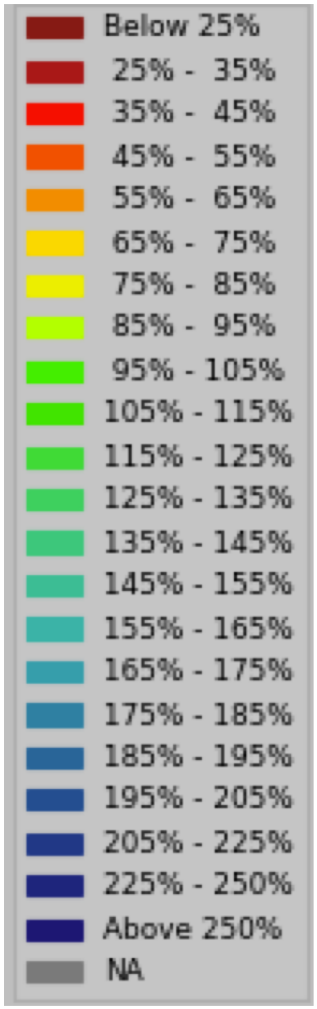
Mean Atmospheric Pattern
First half of February 2018



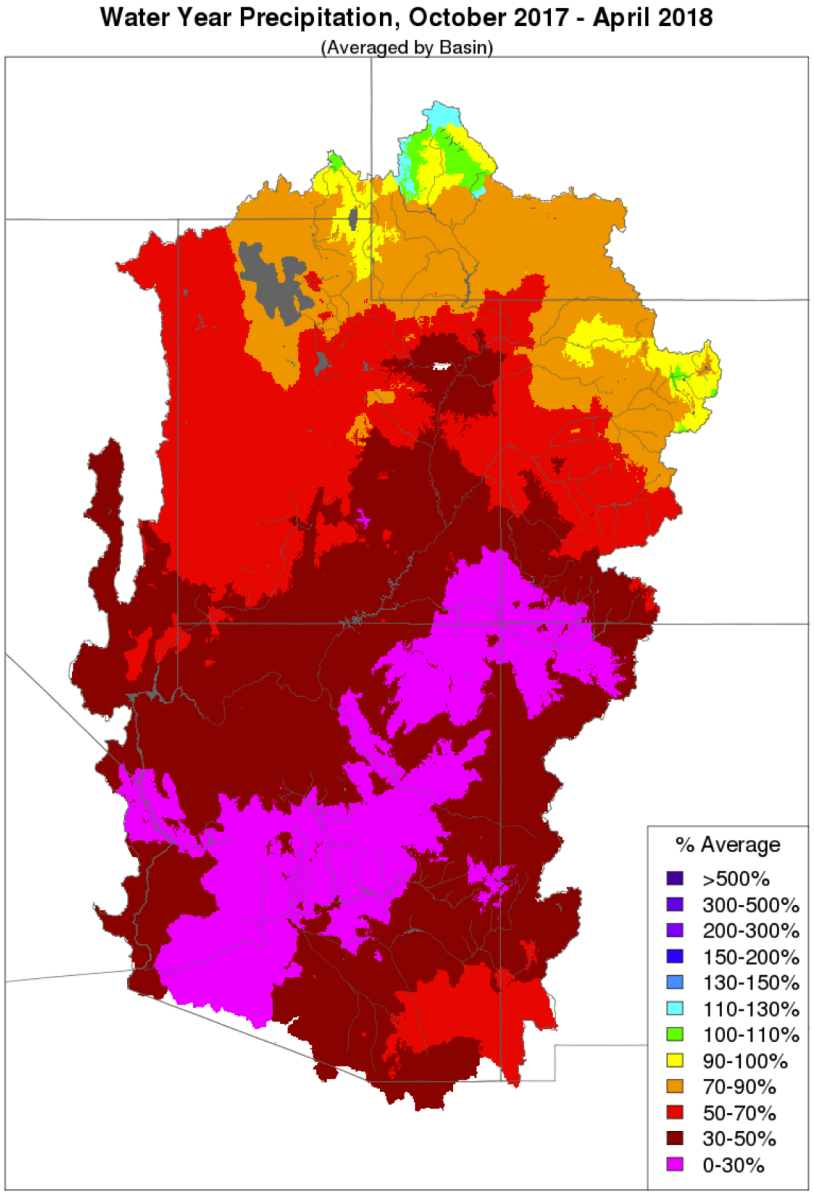
Storm track was around the periphery of the high pressure ridge. Precipitation impacts were limited to far northern and eastern boundaries of the upper Colorado River Basin

Water Supply Outlook: In a hole on January 1st – Fighting an uphill battle ever since.





October 2017 – April 2018 Water Year Precipitation



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

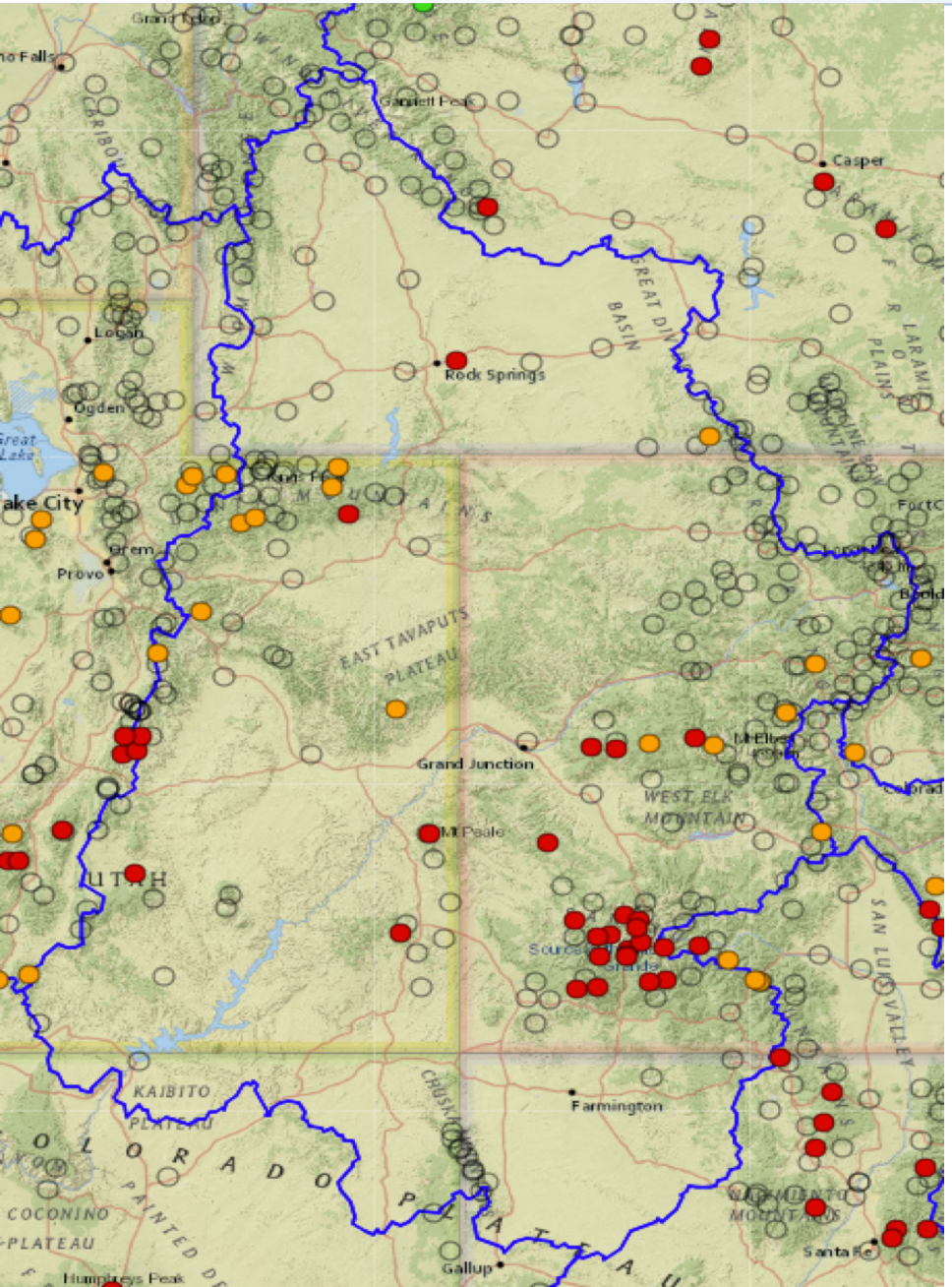
Above Fontenelle

Oct	Nov	Dec	Jan	Feb	Mar	Apr	**TOT**
35	155	105	80	115	110	100	**105**

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	**TOT**
Upper Green	35	80	90	85	90	110	90	**90**
Yampa-White	85	65	55	75	100	85	110	**85**
CO Mainstem	100	55	65	85	105	65	100	**75**
Duchesne	20	80	50	70	50	120	50	**60**
Gunnison	50	45	35	75	100	50	85	**65**
Dolores	30	25	20	75	100	55	40	**50**
San Juan	20	30	20	60	115	45	35	**45**
Virgin	*	15	20	90	75	90	70	**55**
Little Colorado	*	*	*	50	85	40	10	**30**
Salt-Verde	*	*	*	50	80	35	10	**30**
Gila	5	5	20	25	160	40	15	**40**

* Less than 5% of average

Record low water year (October – April) in many locations

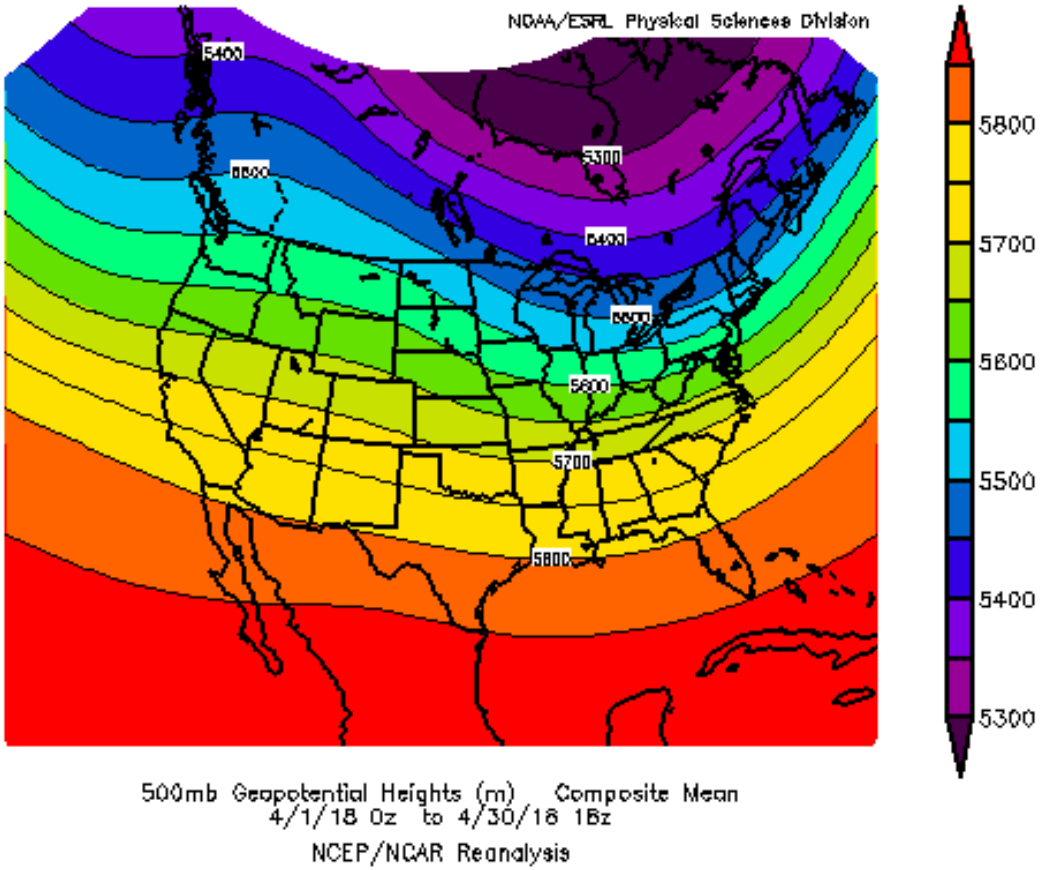


Most stations displayed have a 24-40 year period of record

84 year period of record for a San Juan Basin site

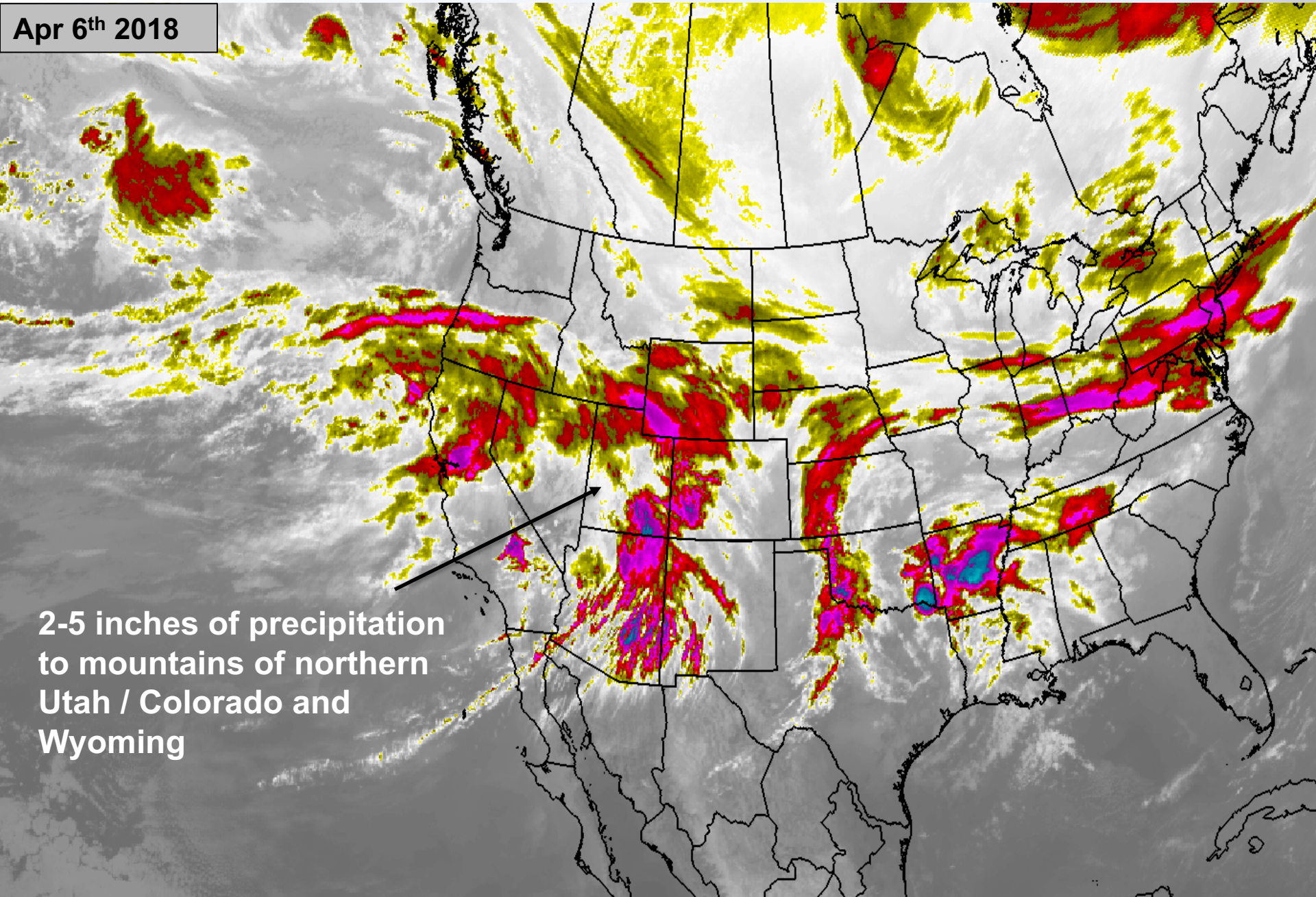
April Weather Pattern:

Mean Atmospheric Pattern
April 2018

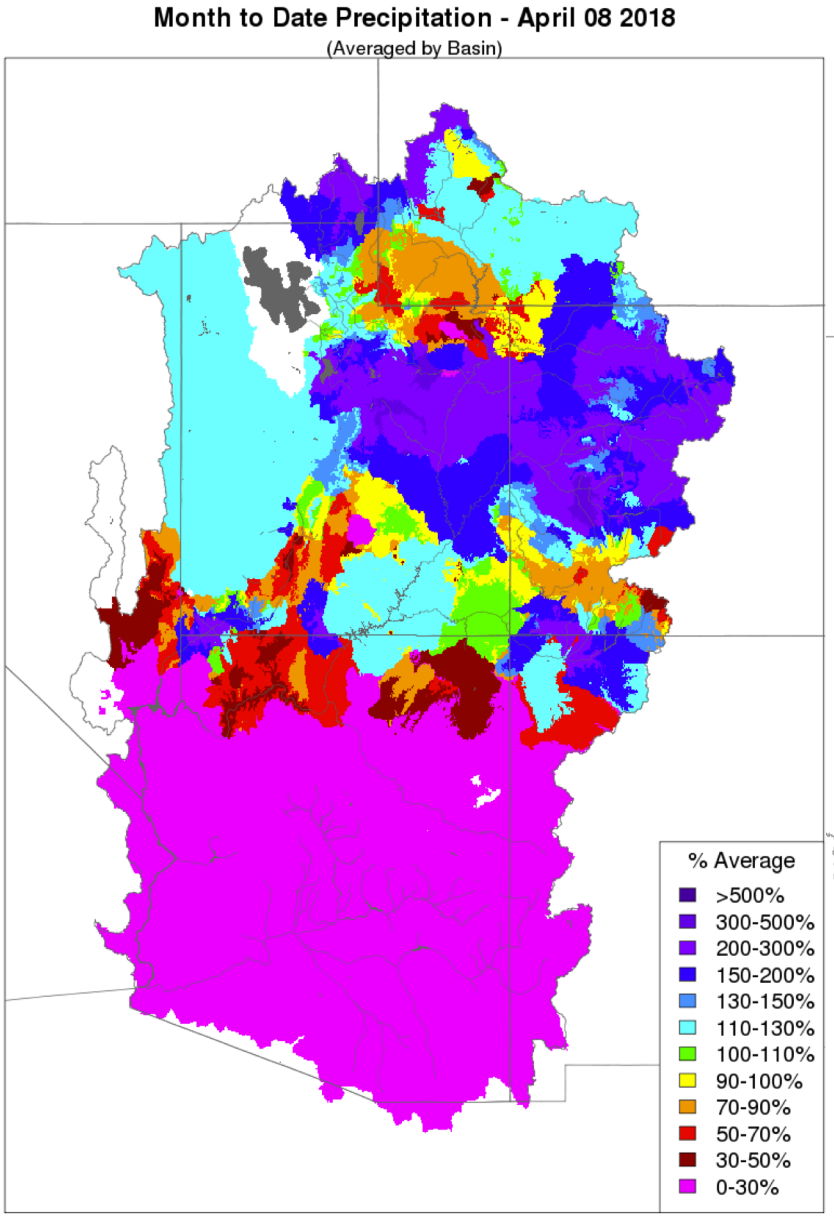


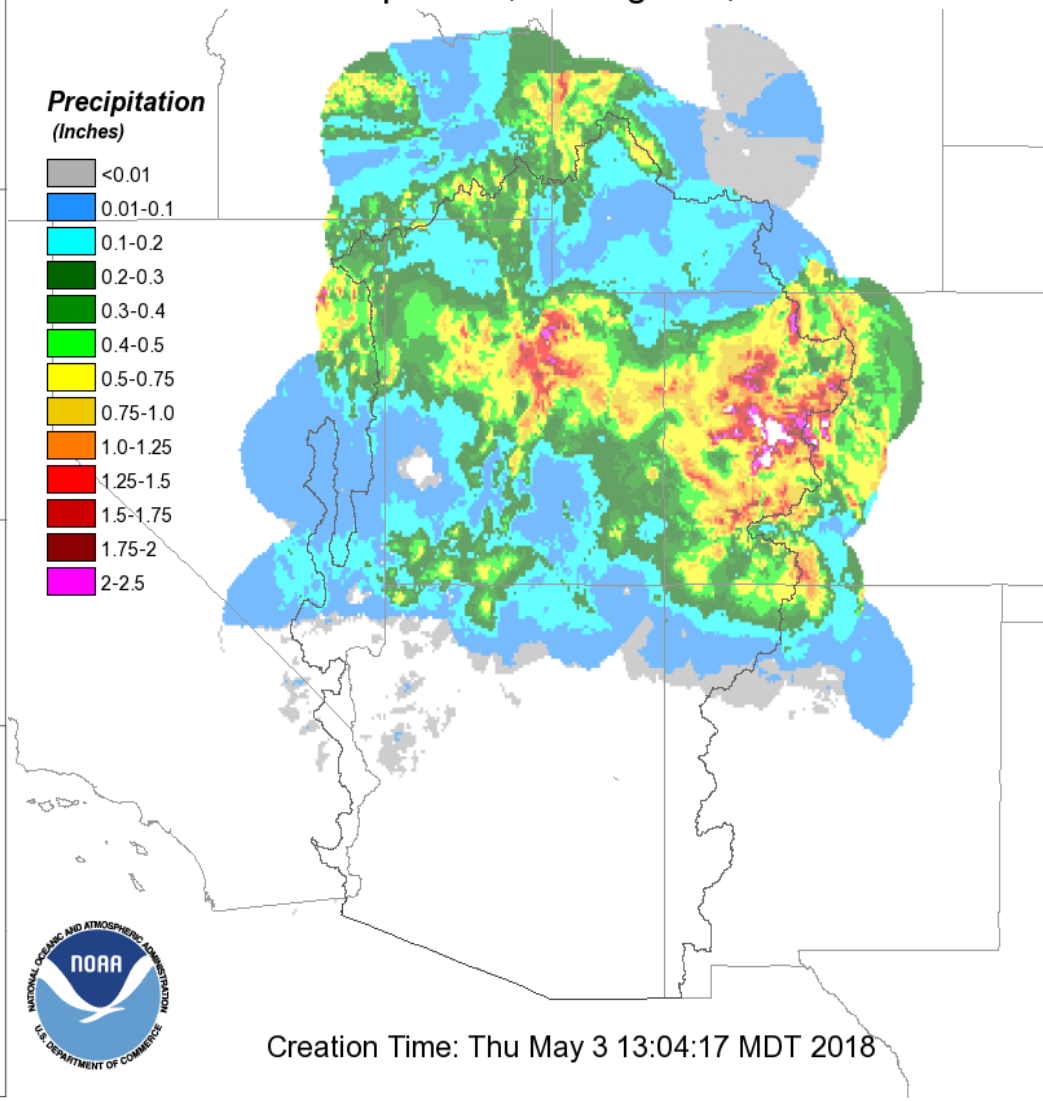
Mean atmospheric high pressure ridge
Generally below average precipitation and above average temperatures

April Weather: A significant amount of April precipitation came from a storm system April 6th – April 8th. Warm system – high freezing levels – minor snowpack improvement

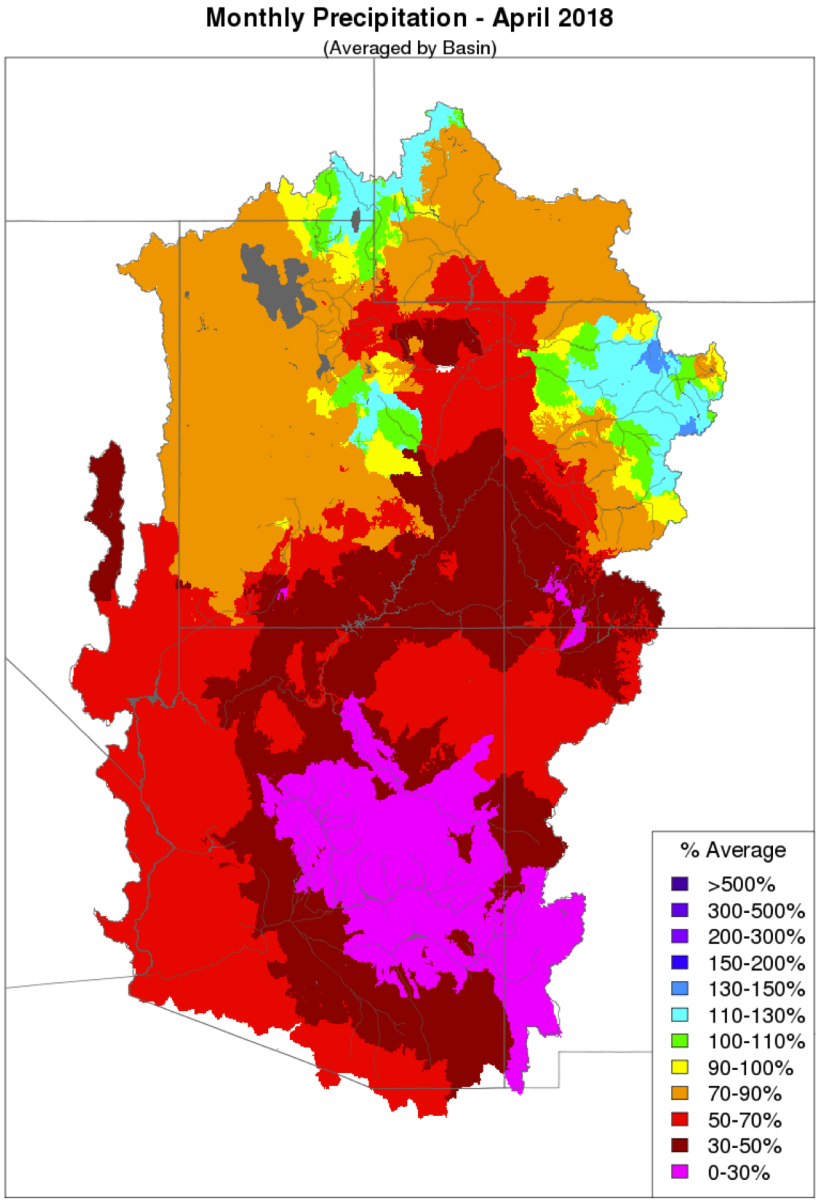


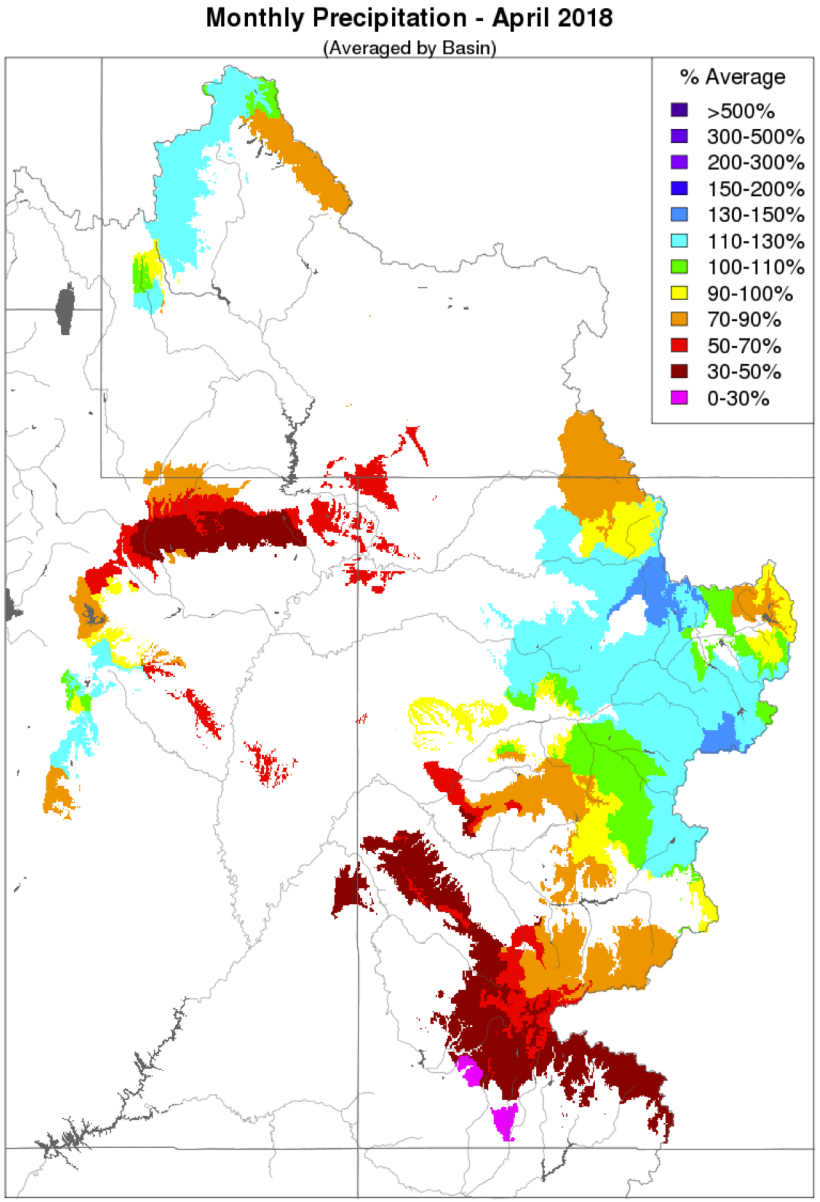
April 2018 Precipitation: Precipitation through the first week of the month





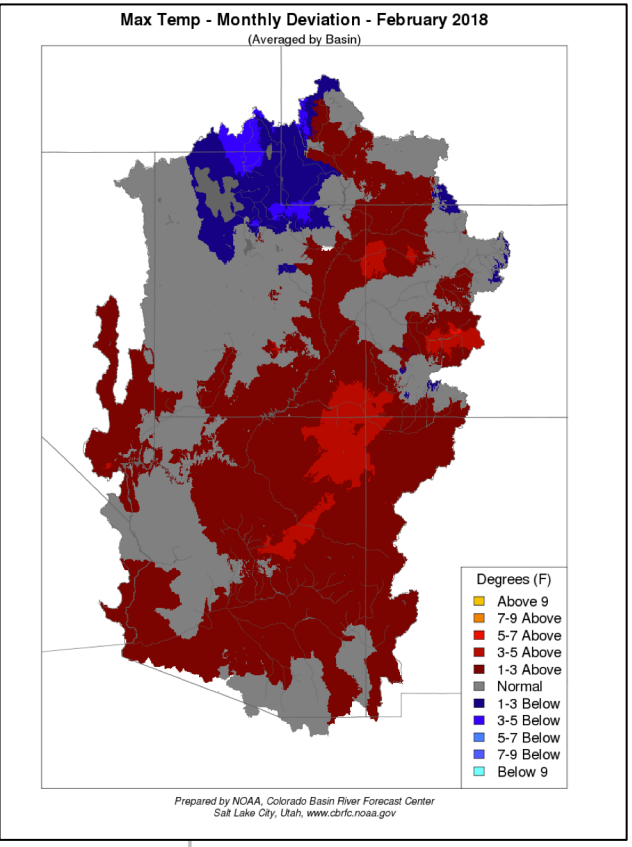
April 2018 Precipitation





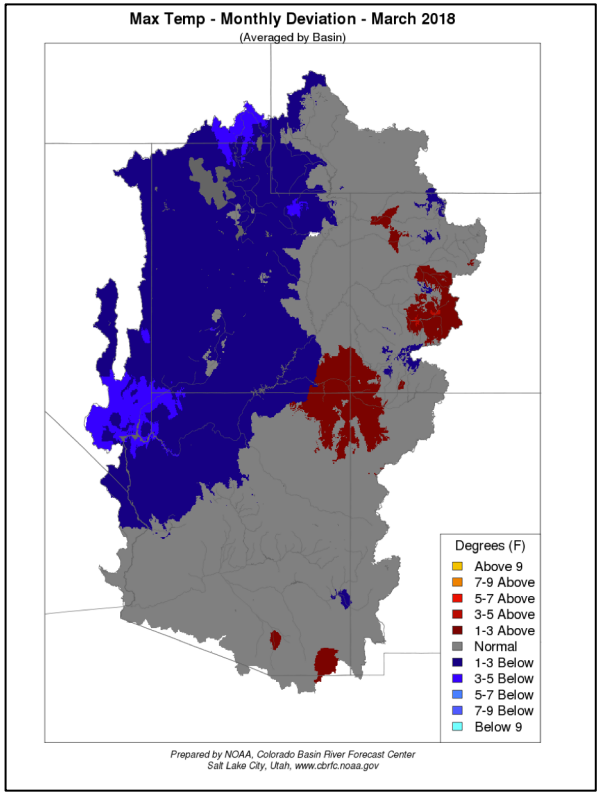
2018 Temperatures – Mean Monthly Maximum Deviation from Normal

February

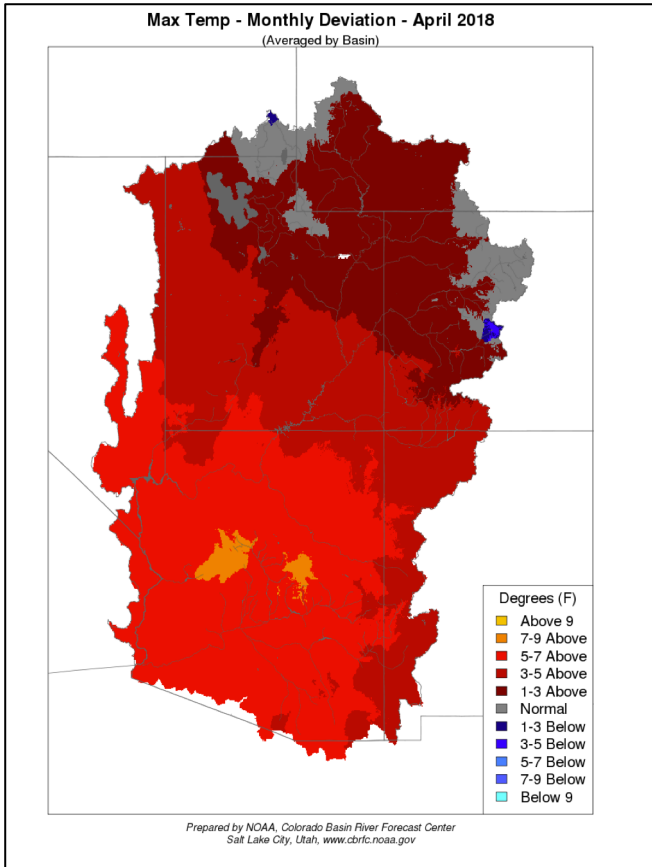


Degrees (F)
Above 9
7-9 Above
5-7 Above
3-5 Above
1-3 Above
Normal
1-3 Below
3-5 Below
5-7 Below
7-9 Below
Below 9

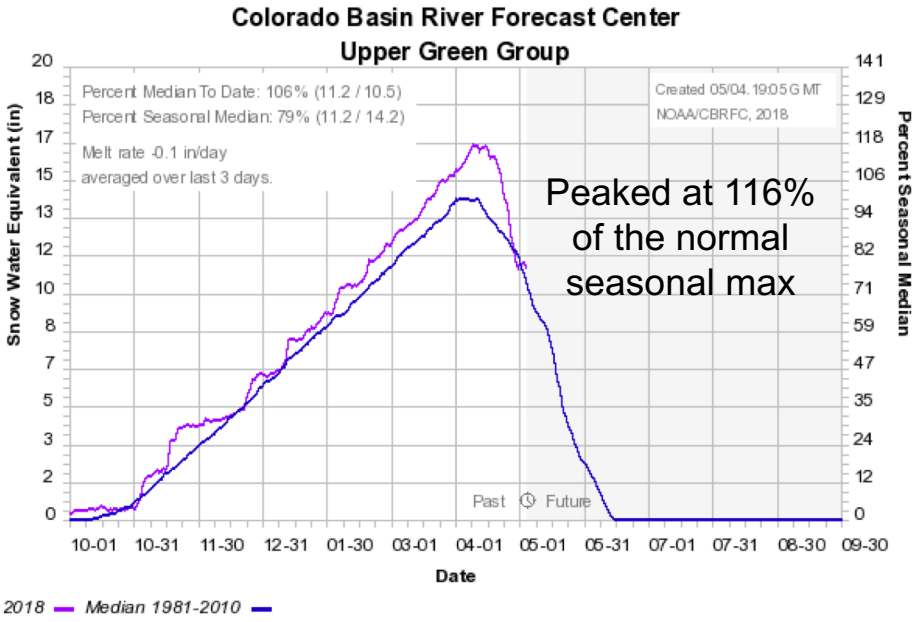
March

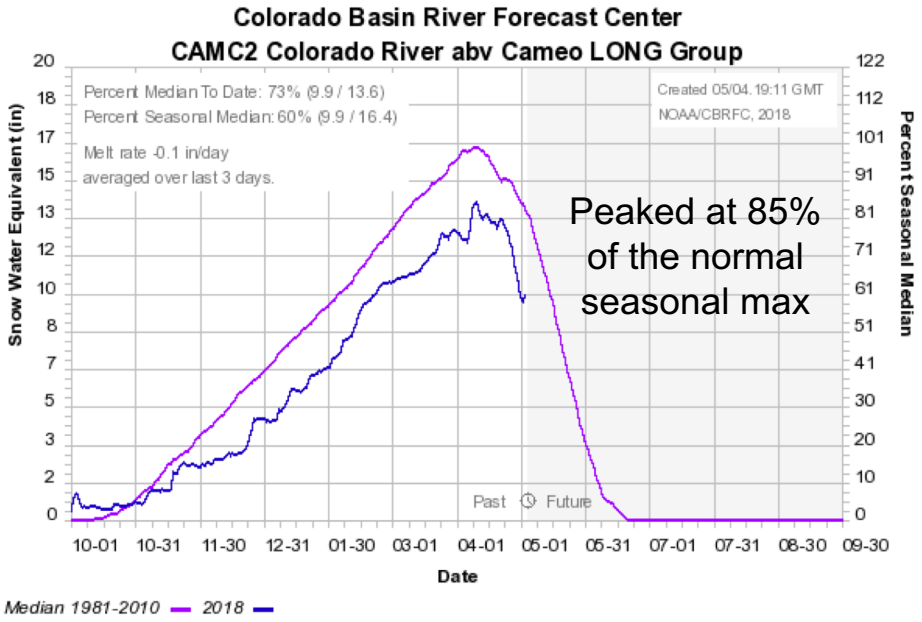


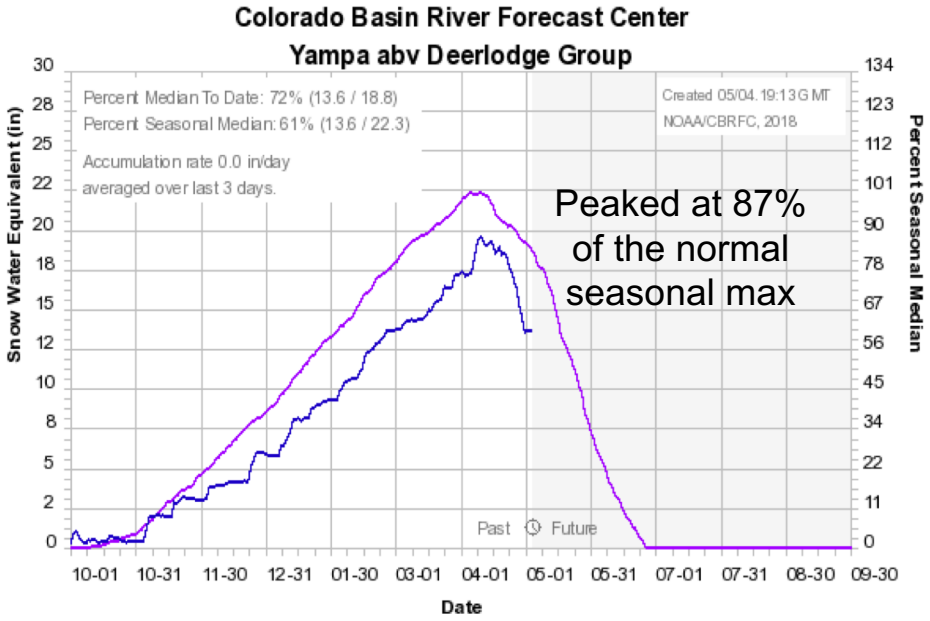
April

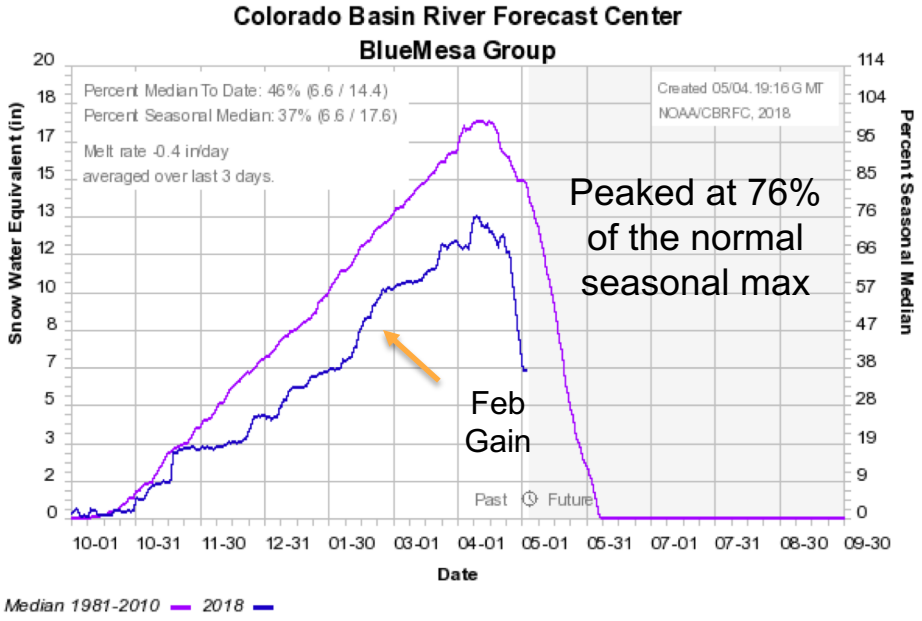


2018 Snowpack Evolution

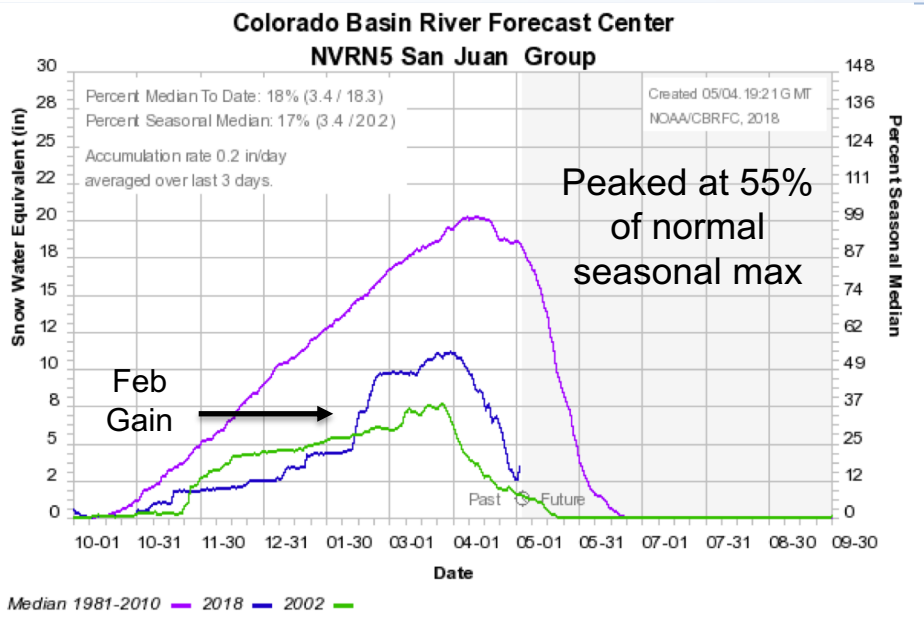


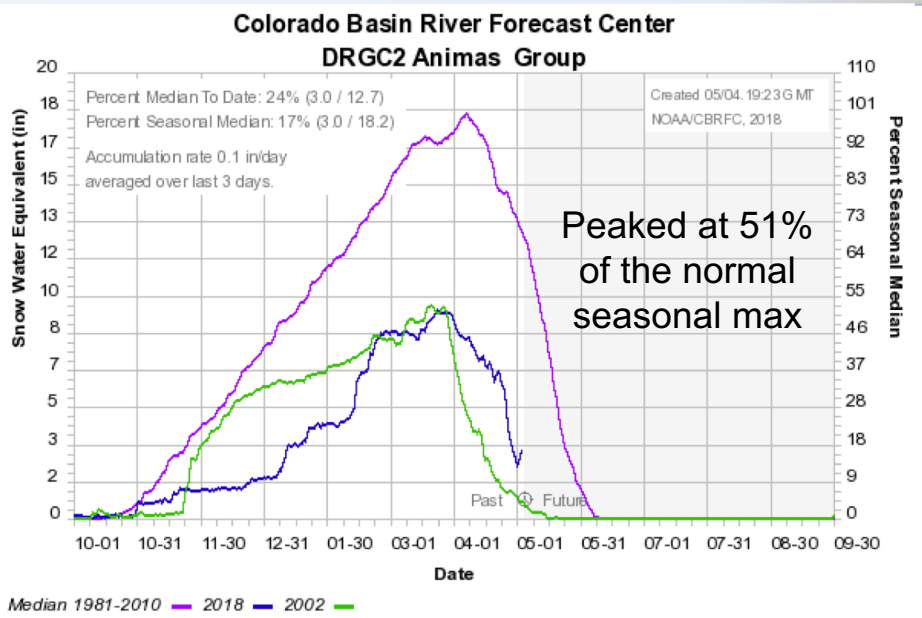


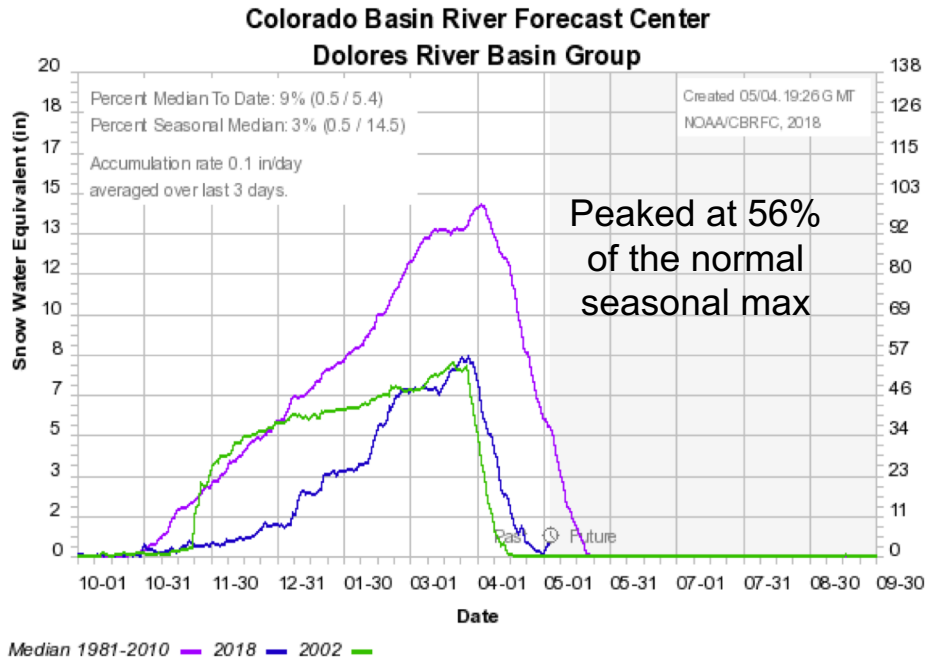


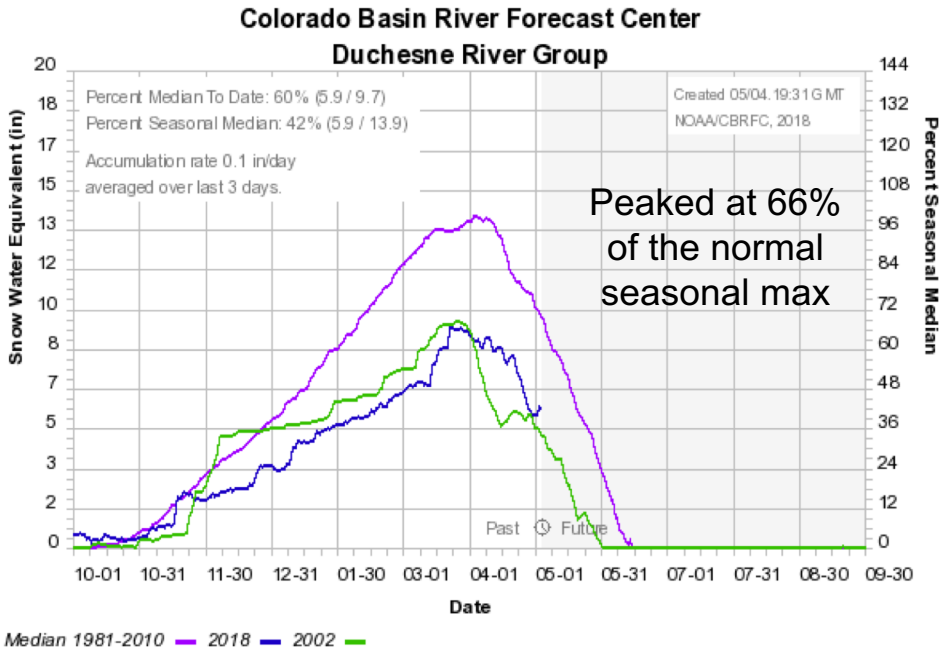


2018 Snowpack Evolution

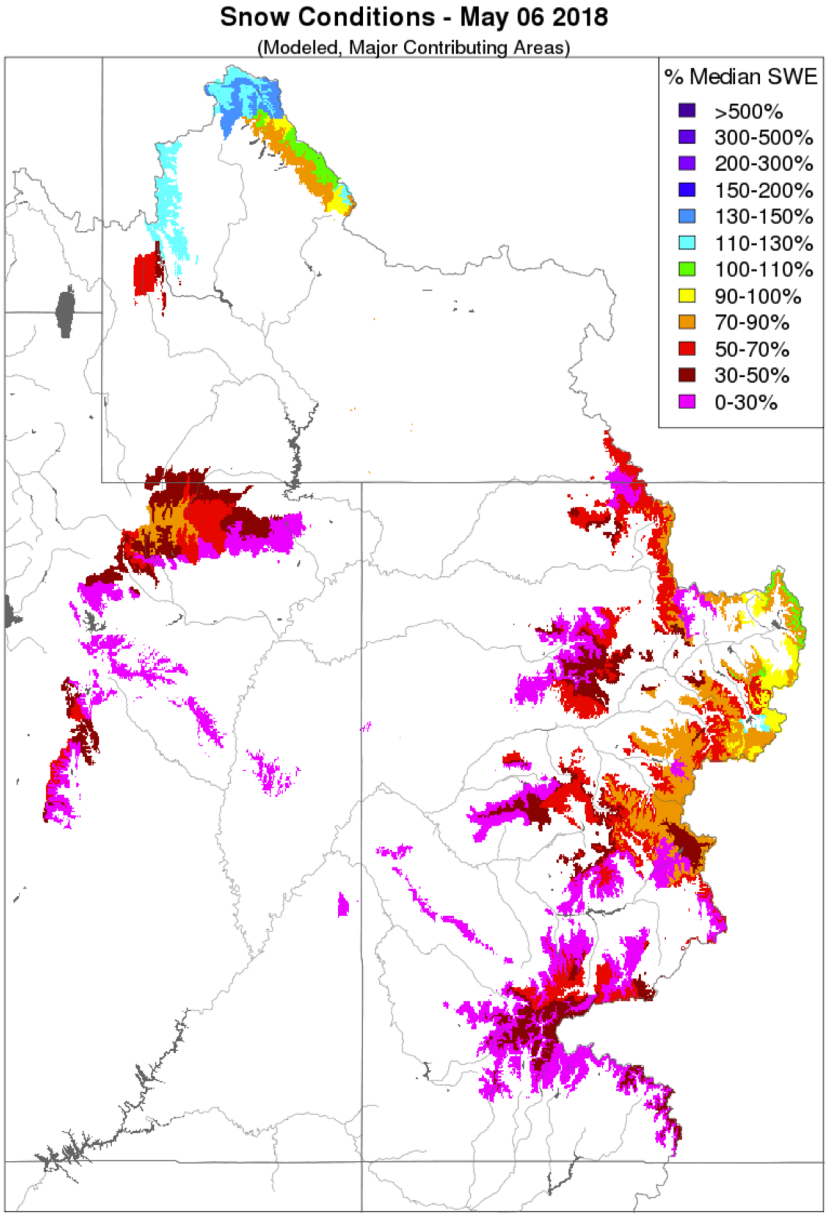


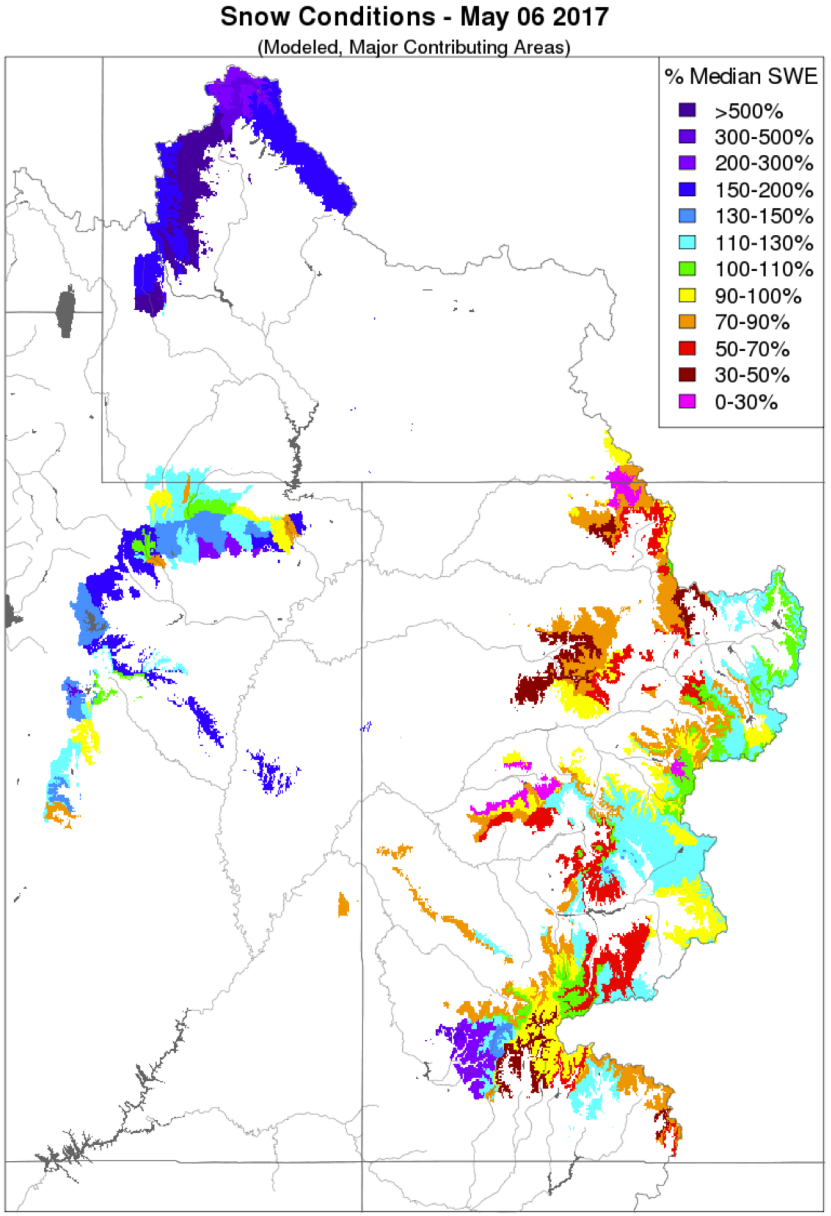




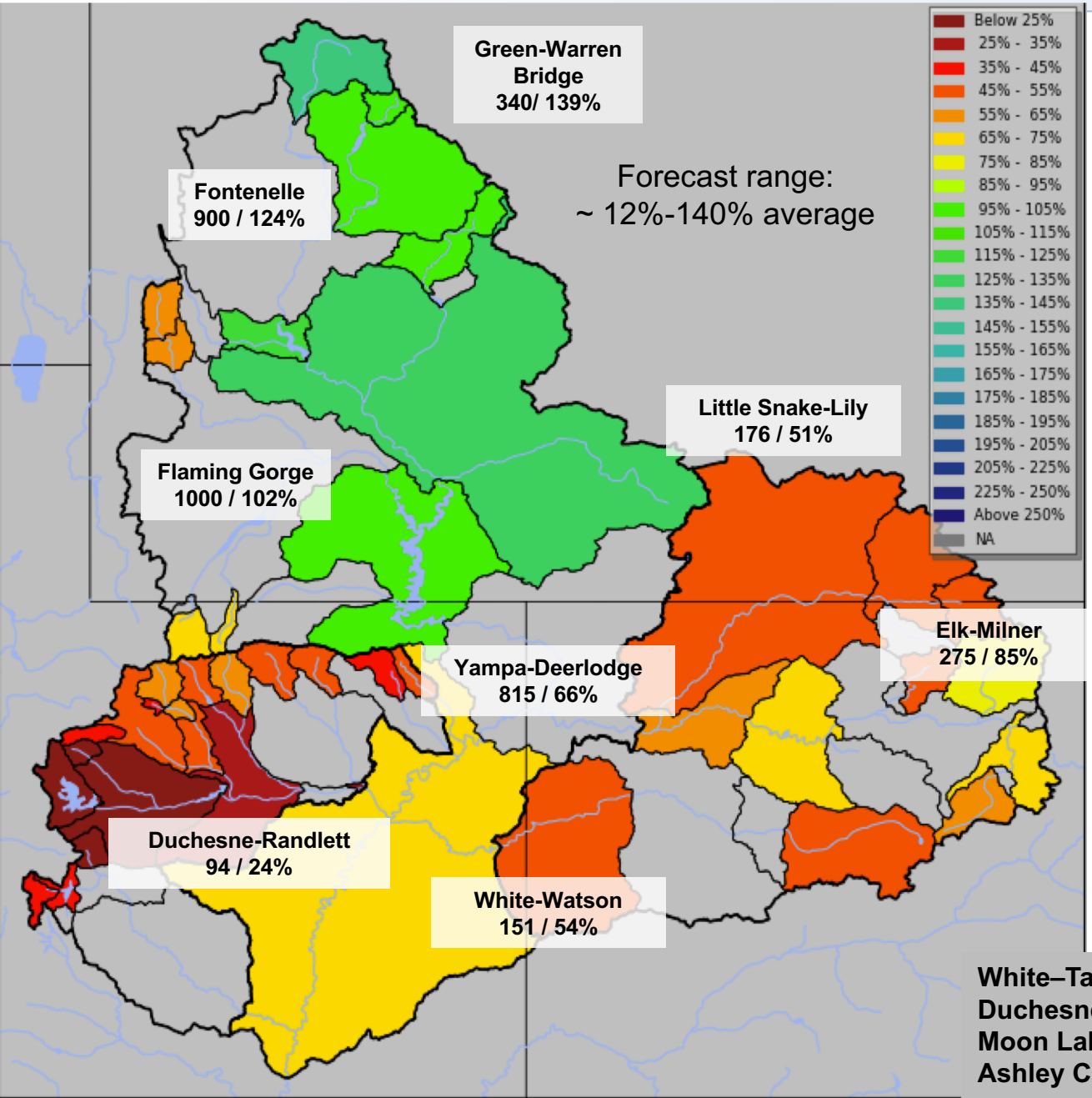


Snow Conditions: CBRFC hydrologic model – Now and Last year at this time





Upper Colorado: Green-Yampa-White-Duchesne



Forecasts as of May1 2018

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

Duchesne:
Decrease of 5-15% of average

Upper Green:
Change of -5 to +15% of average

White/Yampa
Change of -1 to +12 % decrease

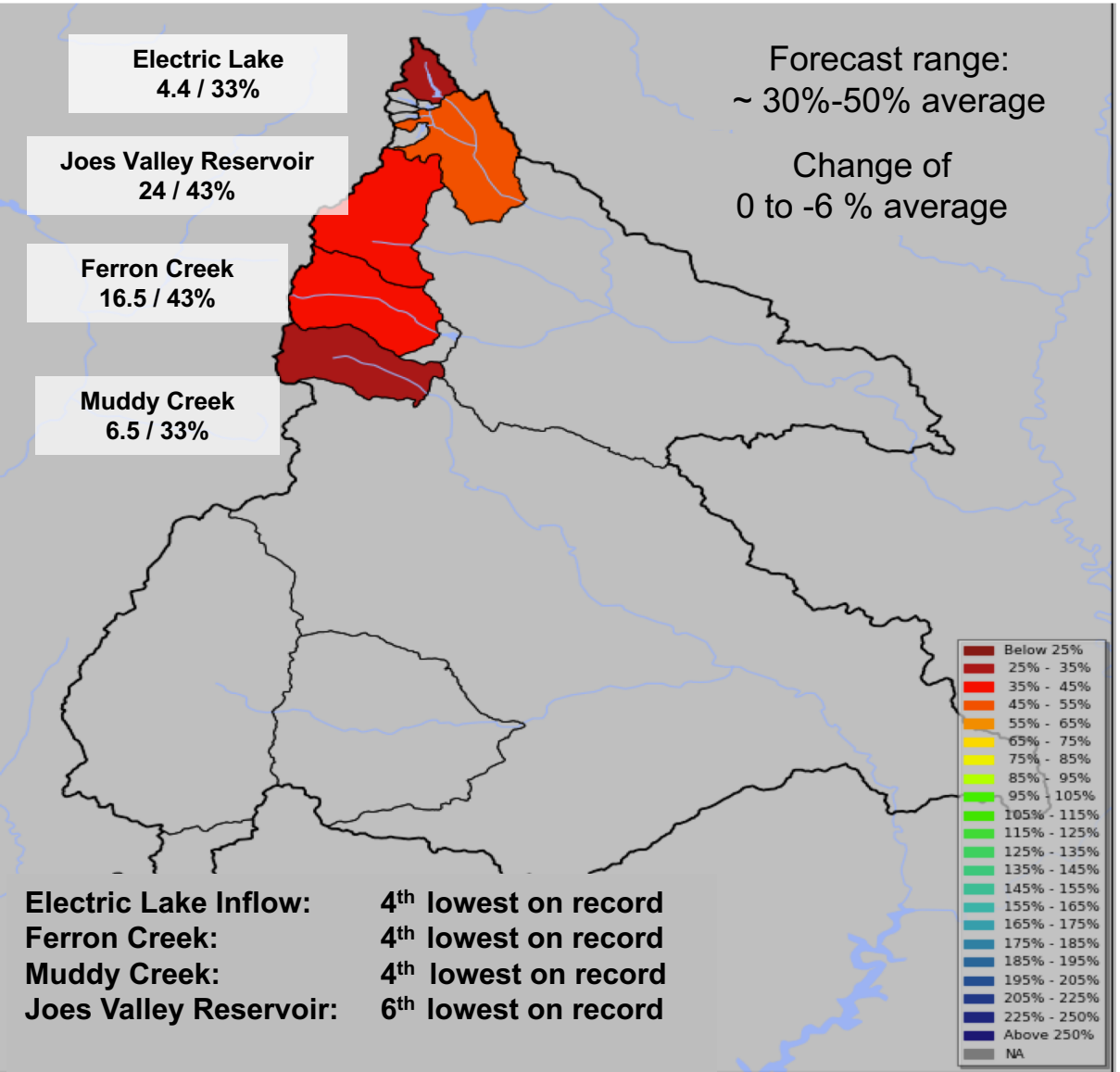
White–Tabbyune ck(ut):	**2nd lowest on record**
Duchesne-Randlett:	**5th lowest on record**
Moon Lake Inflow:	**5th lowest on record**
Ashley Creek:	**7th lowest on record**

Upper Colorado: San Rafael – Dirty Devil

(Southern Utah – smaller tributaries to the Green and Colorado River)

Forecasts as of May 1 2018

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

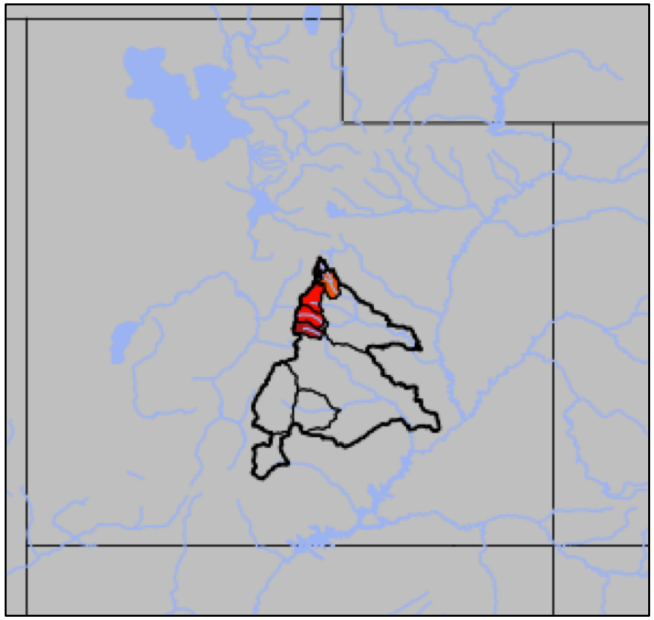


Electric Lake Inflow: 4th lowest on record

Ferron Creek: 4th lowest on record

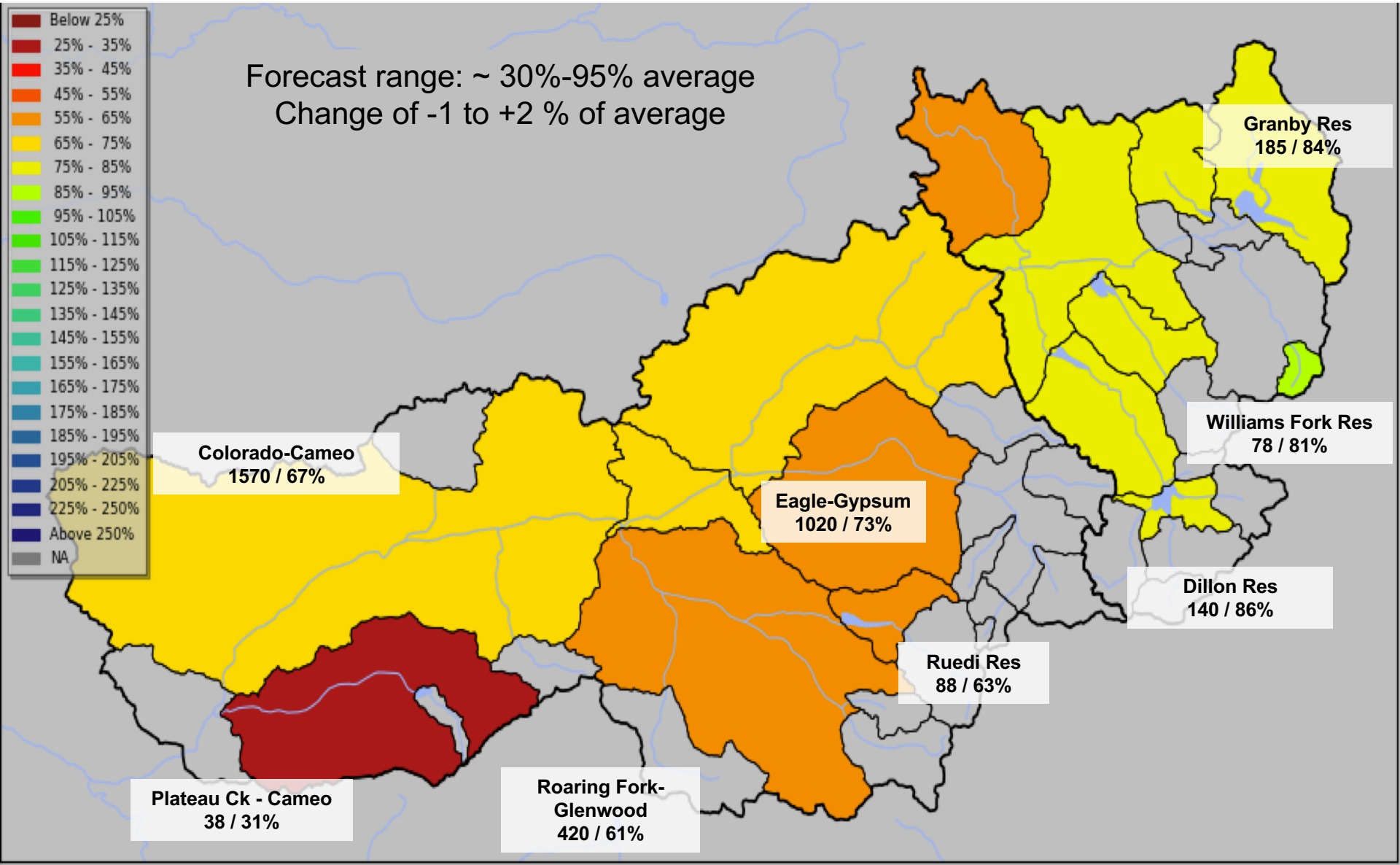
Muddy Creek: 4th lowest on record

Joes Valley Reservoir: 6th lowest on record



Upper Colorado: Colorado River Mainstem

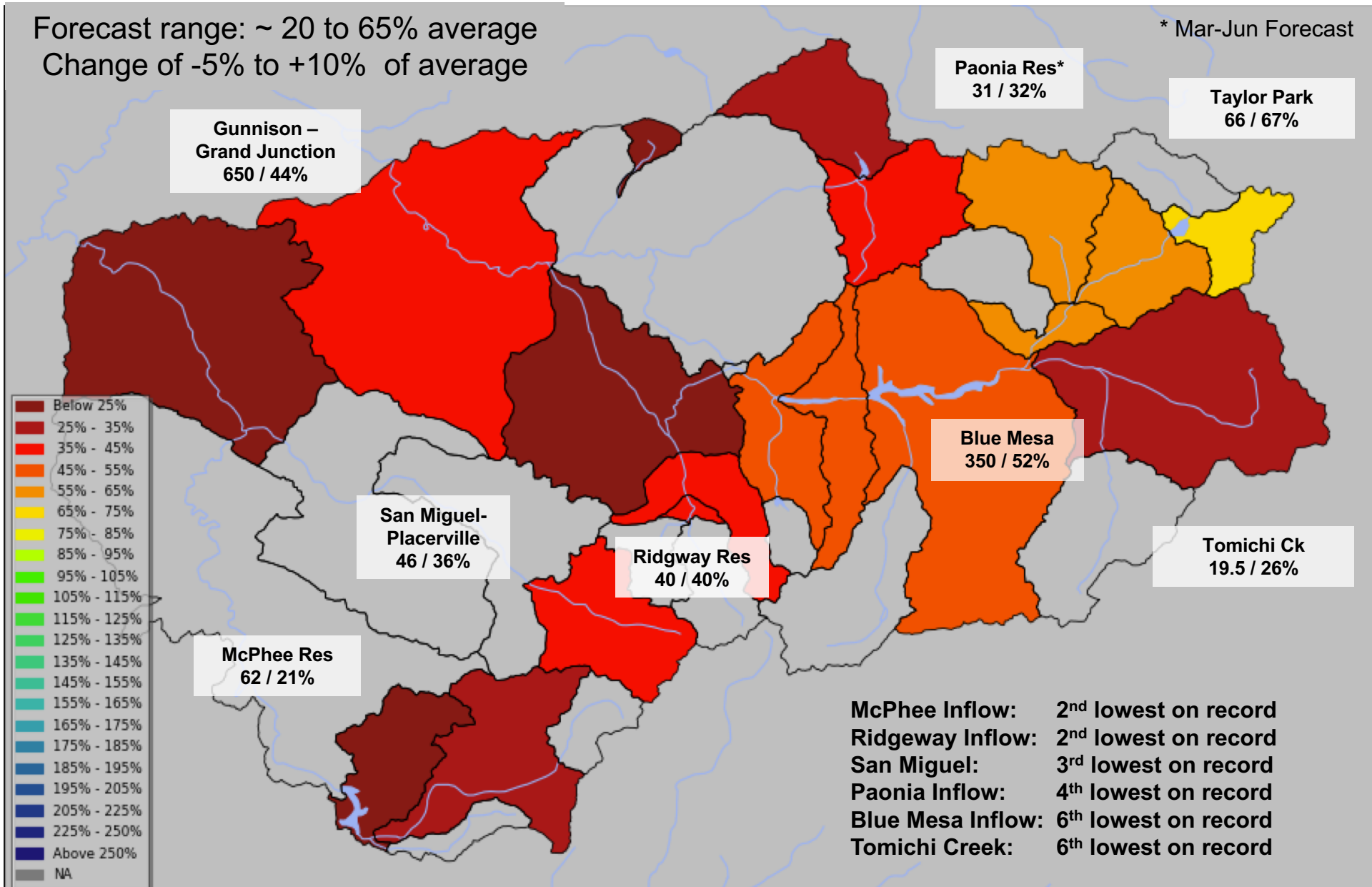
Forecasts as of May 1 2018
Volume in 1000's acre-feet / % of 1981-2010 average



Upper Colorado: Gunnison and Dolores Basins

Forecasts as of May 1 2018

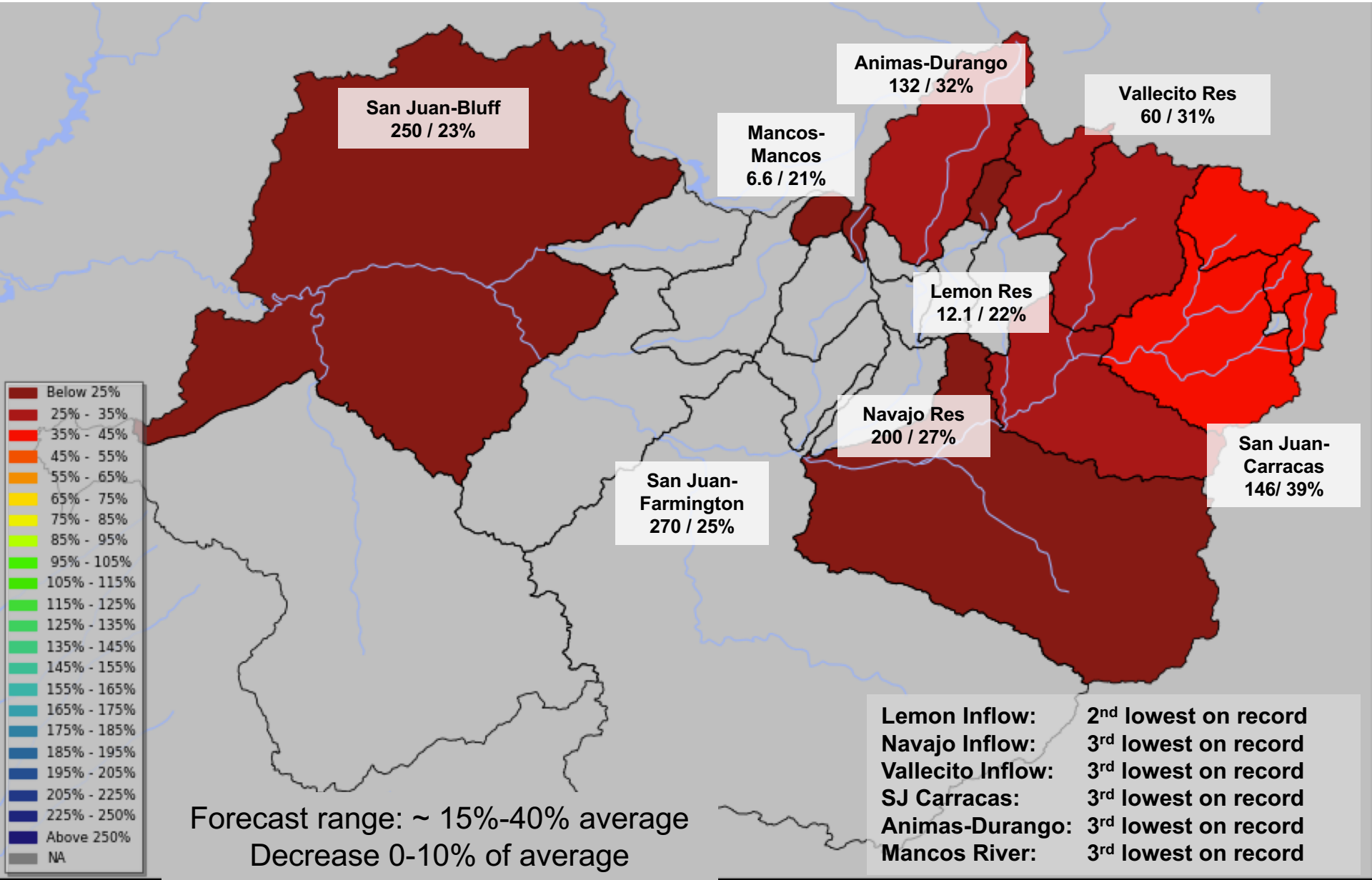
Volume in 1000's acre-feet / % of 1981-2010 average



Upper Colorado: San Juan Basin

Forecasts as of May 1 2018

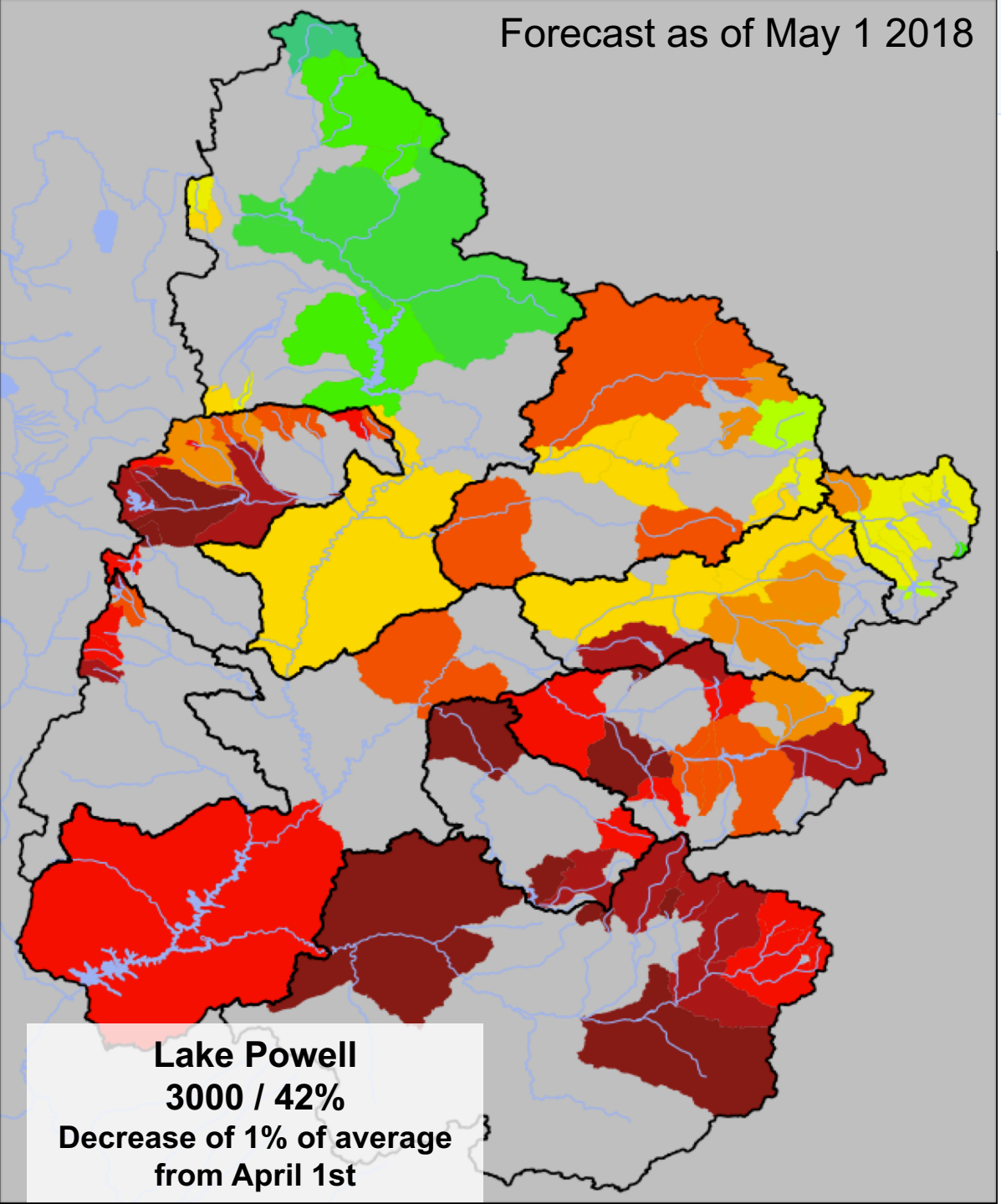
Volume in 1000's acre-feet / % of 1981-2010 average



Forecast range: ~ 15%-40% average

Decrease 0-10% of average

Lemon Inflow:	2nd lowest on record
Navajo Inflow:	3rd lowest on record
Vallecito Inflow:	3rd lowest on record
SJ Carracas:	3rd lowest on record
Animas-Durango:	3rd lowest on record
Mancos River:	3rd lowest on record



Upper Colorado April-July Streamflow Volume Forecasts

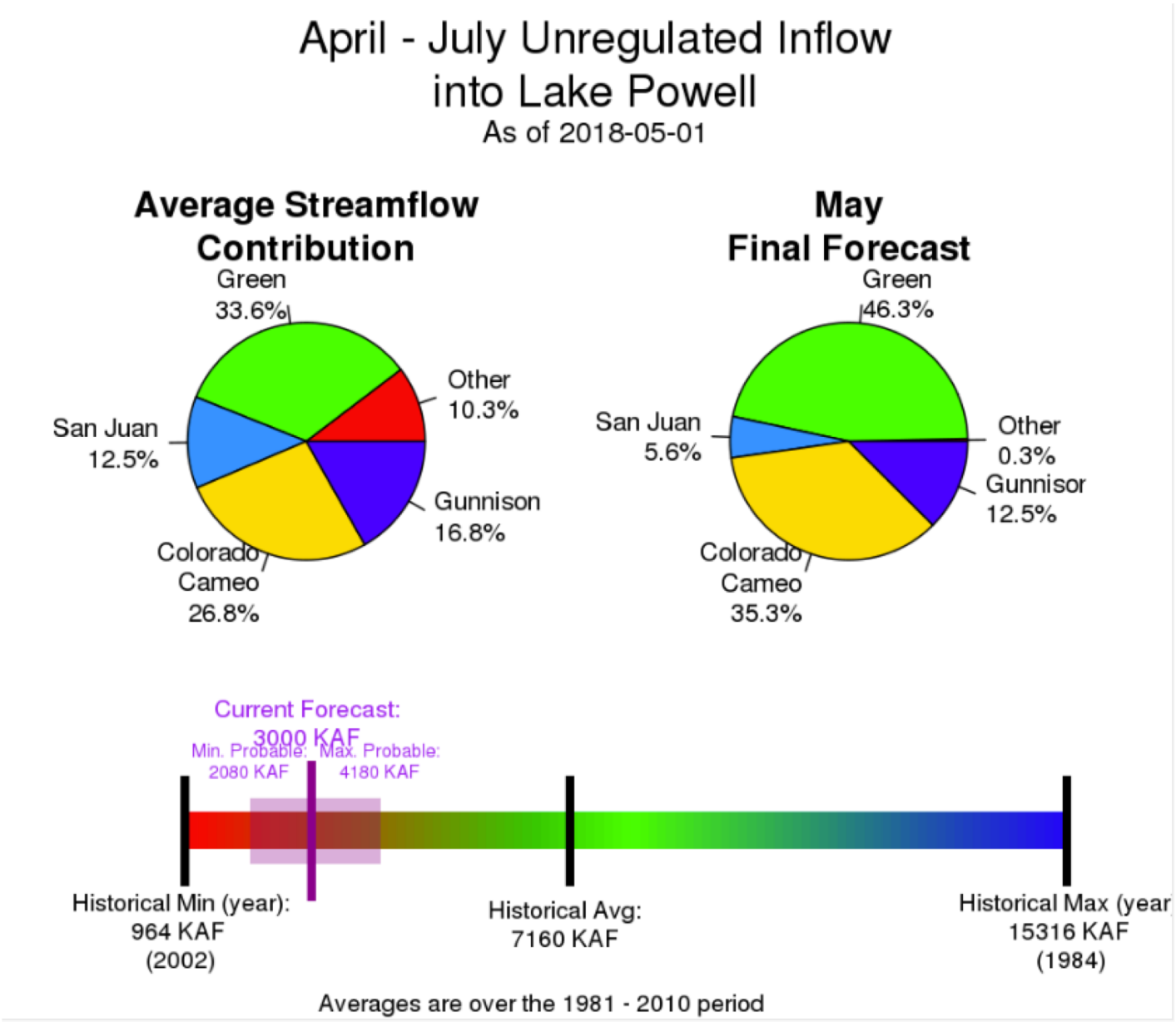
(% of 1981-2010 average)

Lake Powell:
3000 KAF / 42 % average
5th lowest on record

- 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

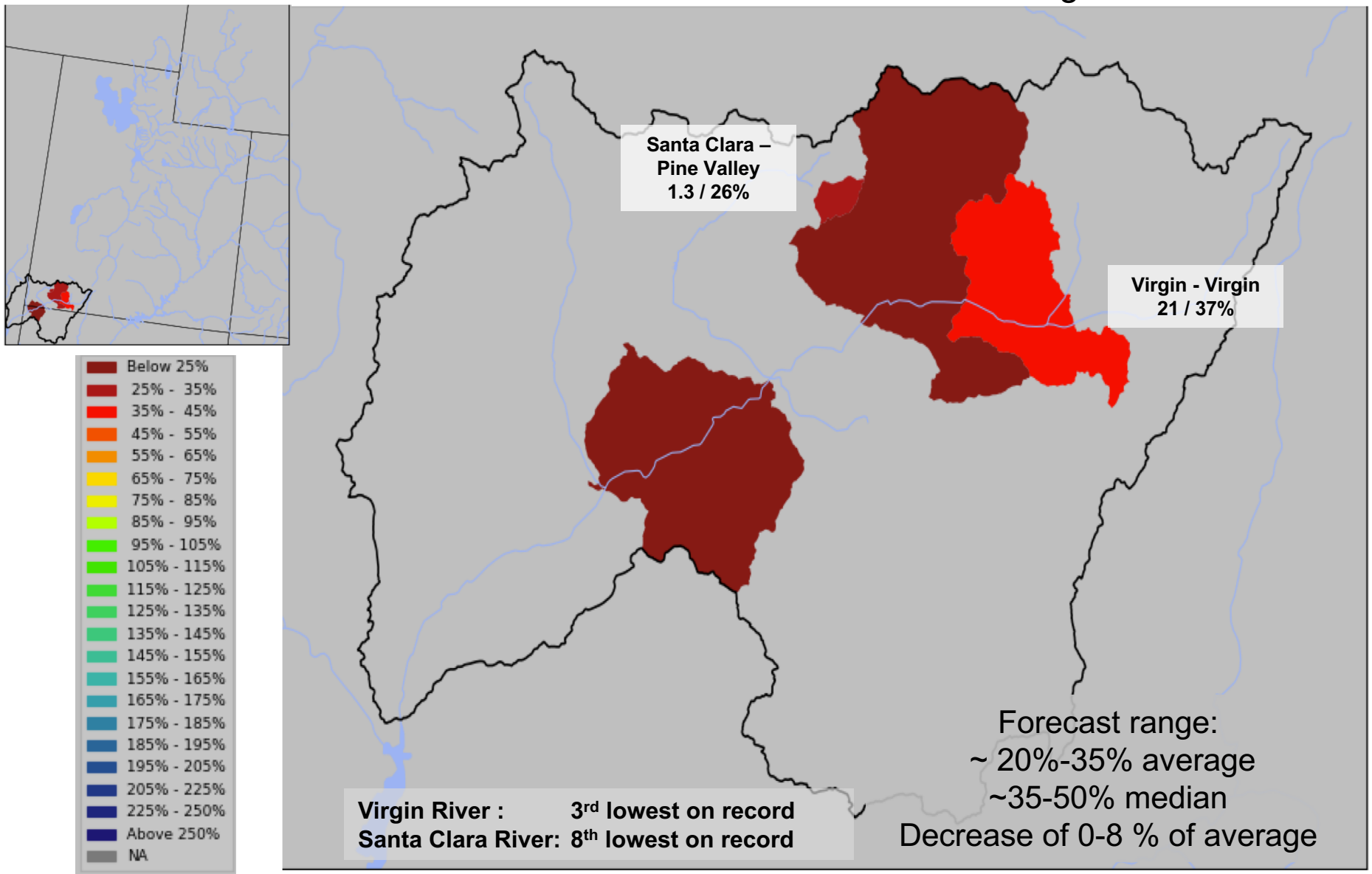
Lake Powell – Forecast Inflow Distribution Comparison – 2018 vs Historical Average

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



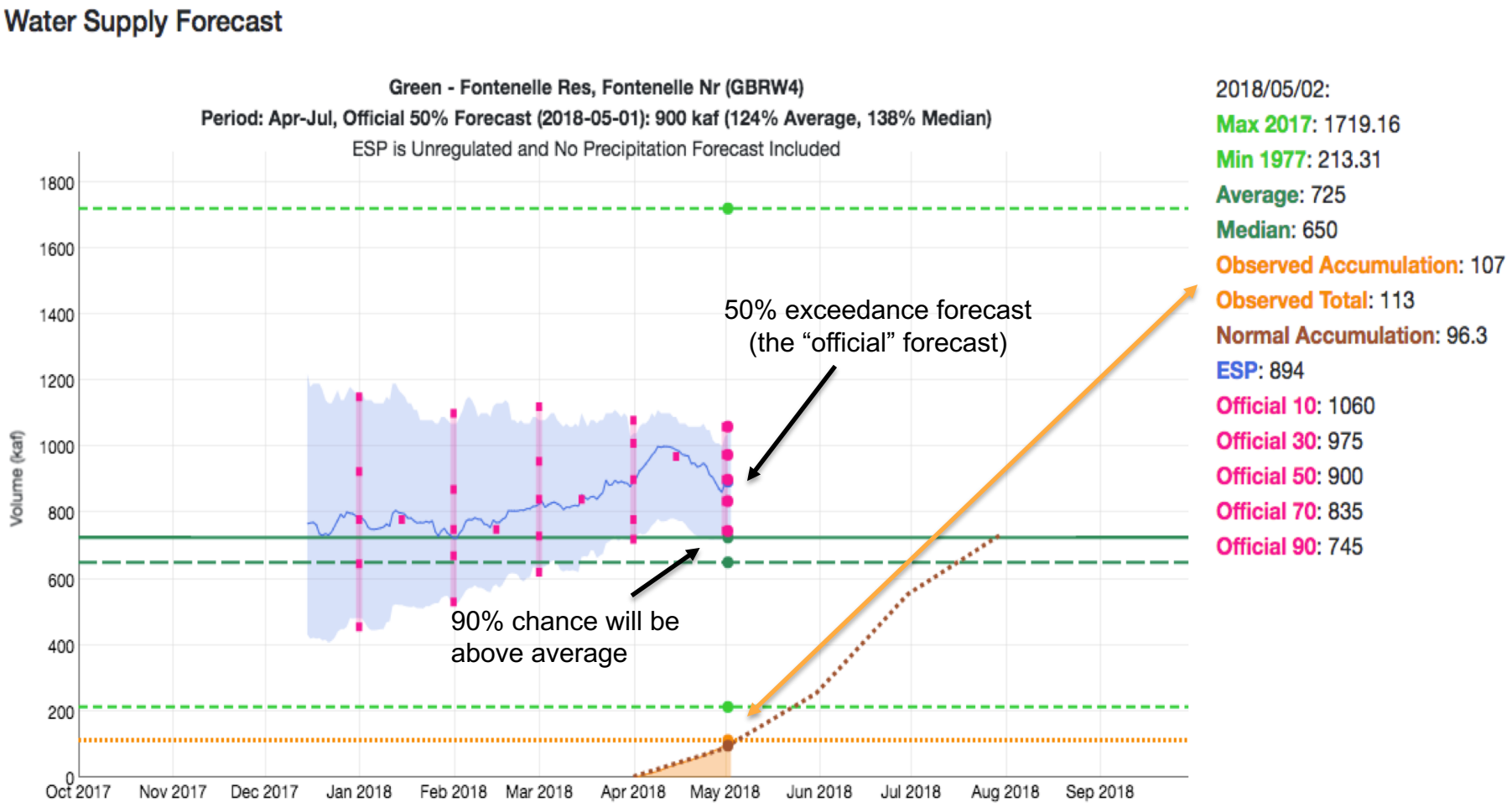
Lower Colorado (Virgin River) April-July Streamflow Volume Forecasts

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



Forecast Evolution Plot: Fontenelle Inflow

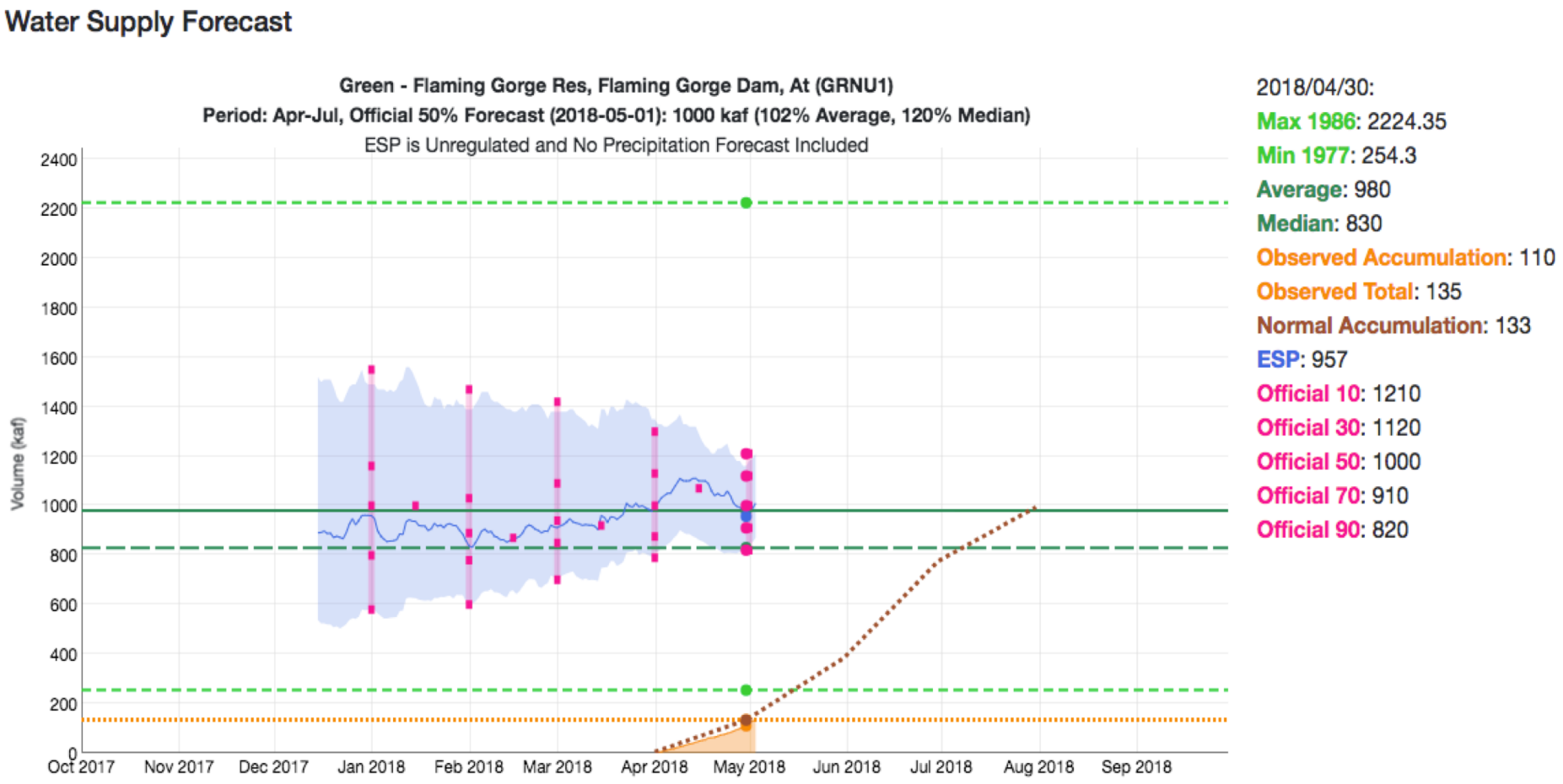
April-July Forecast: 124% of average



Forecast is a combination of observed from April 1st until current date and model guidance from current date through July 31st

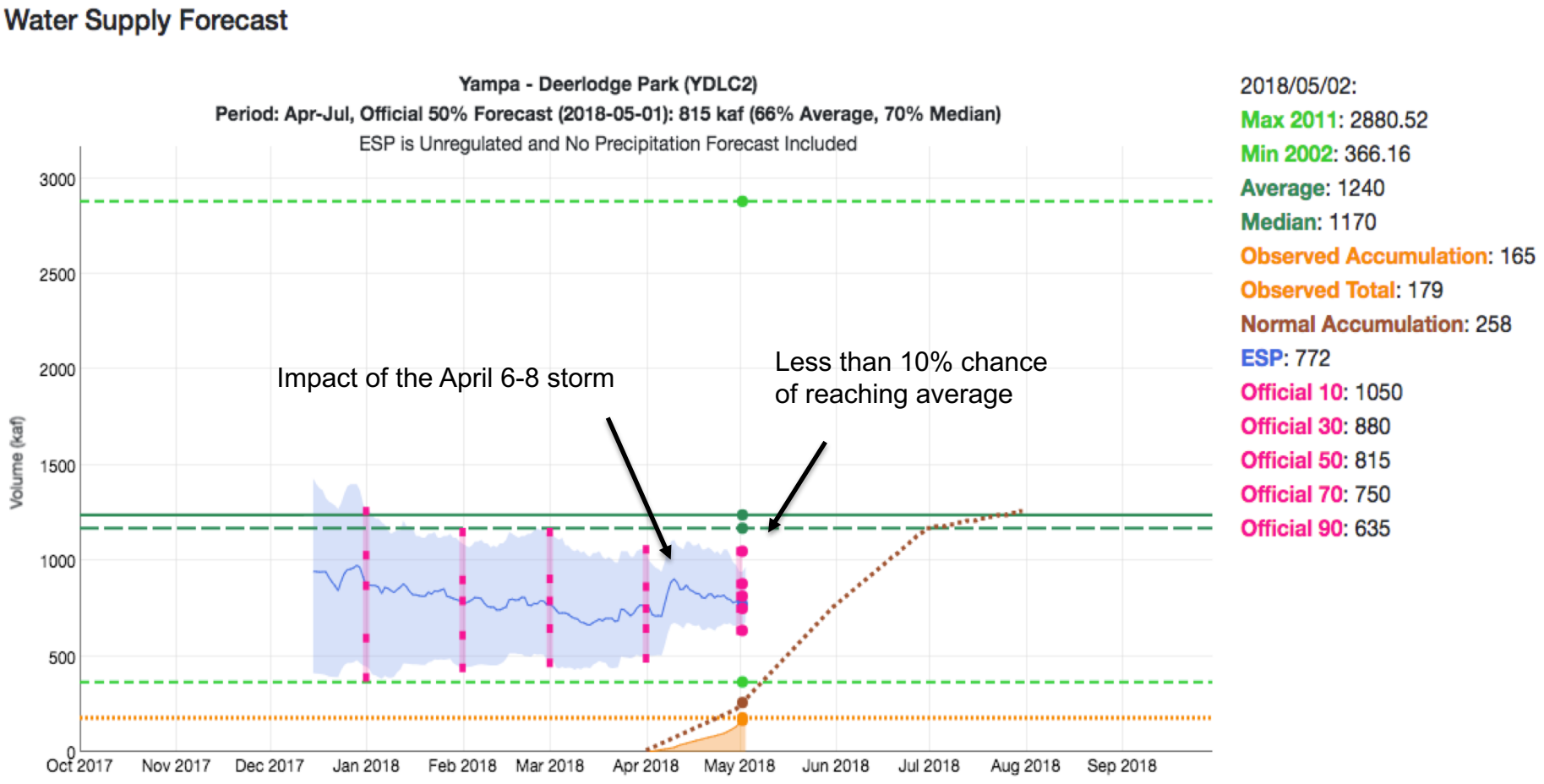
Forecast Evolution Plot: Flaming Gorge Inflow

April-July Forecast: 102% of average



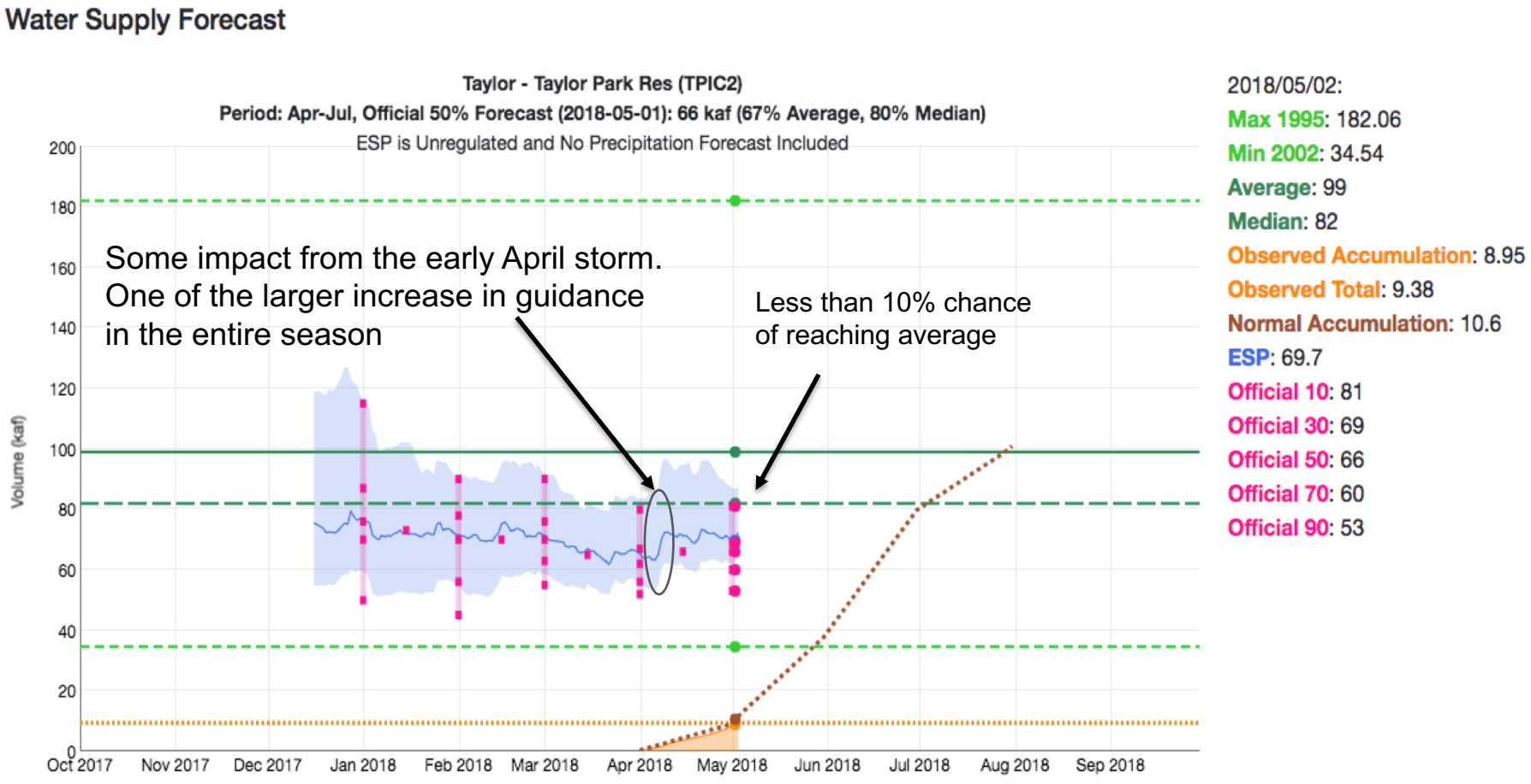
Forecast Evolution Plot: Yampa River @ Deerlodge

April-July Forecast 66% of average



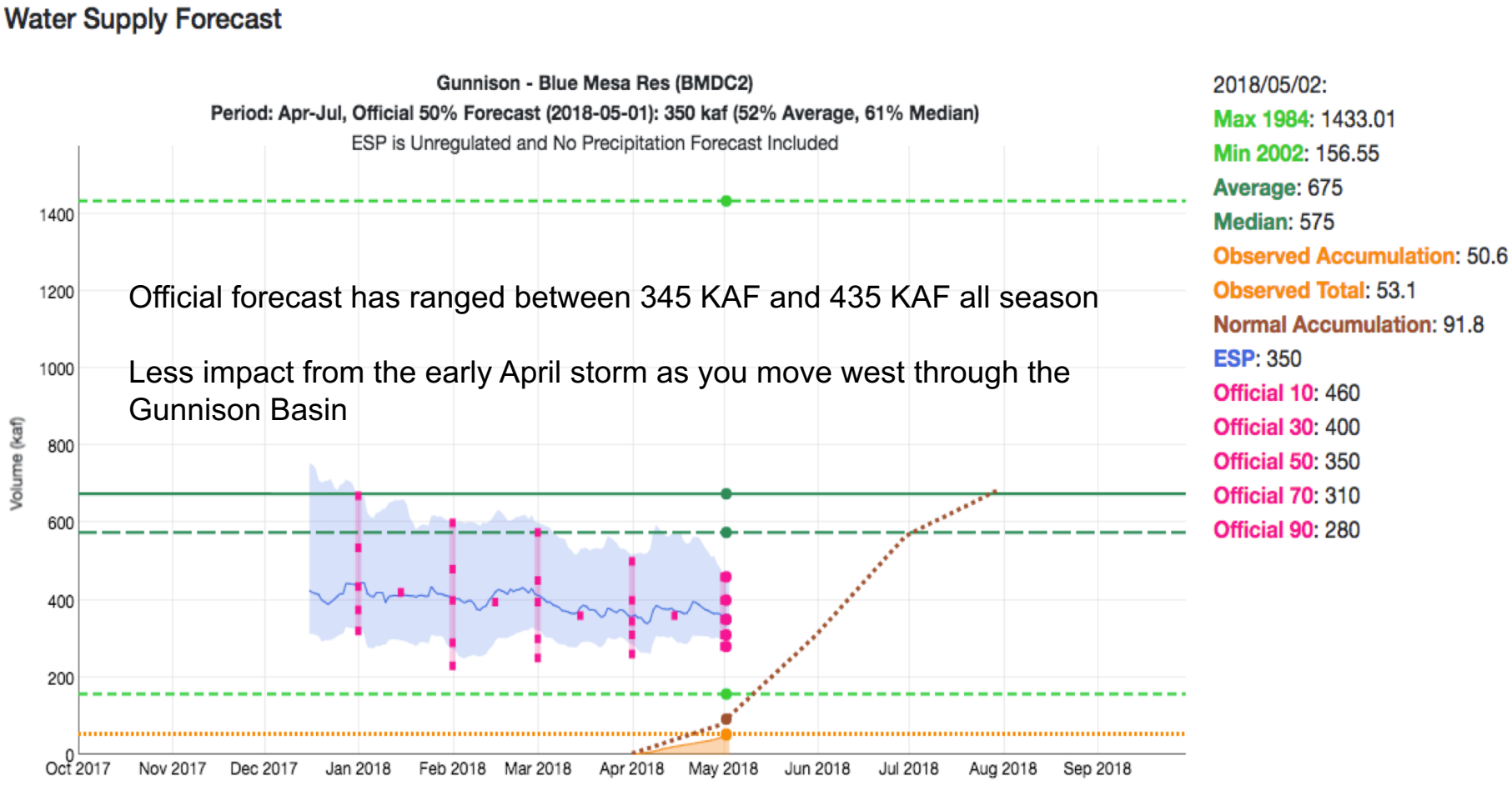
Forecast Evolution Plot: Taylor Park Inflow

April-July Forecast 67% of average



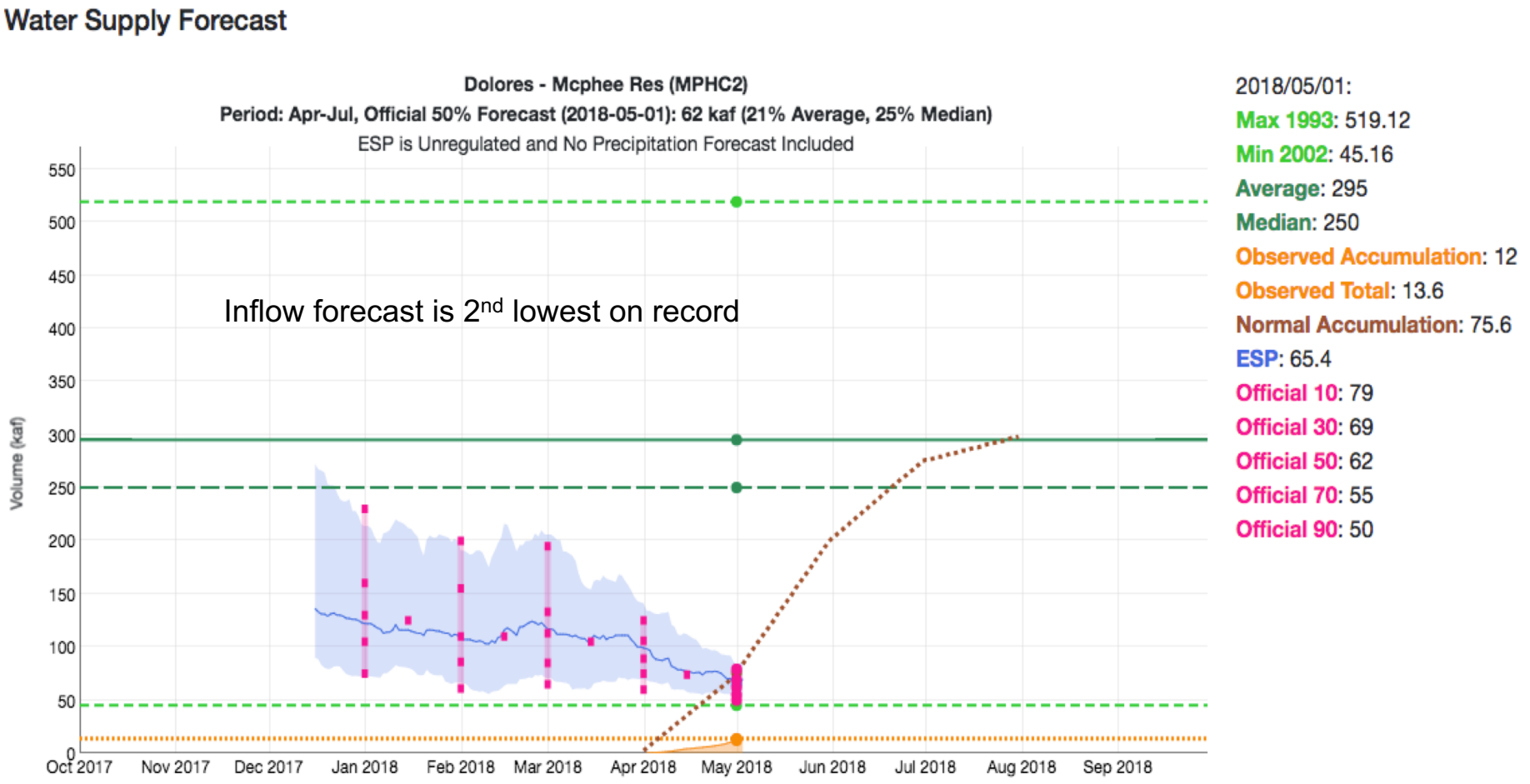
Forecast Evolution Plot: Blue Mesa Reservoir Inflow

April-July Forecast 52% of average



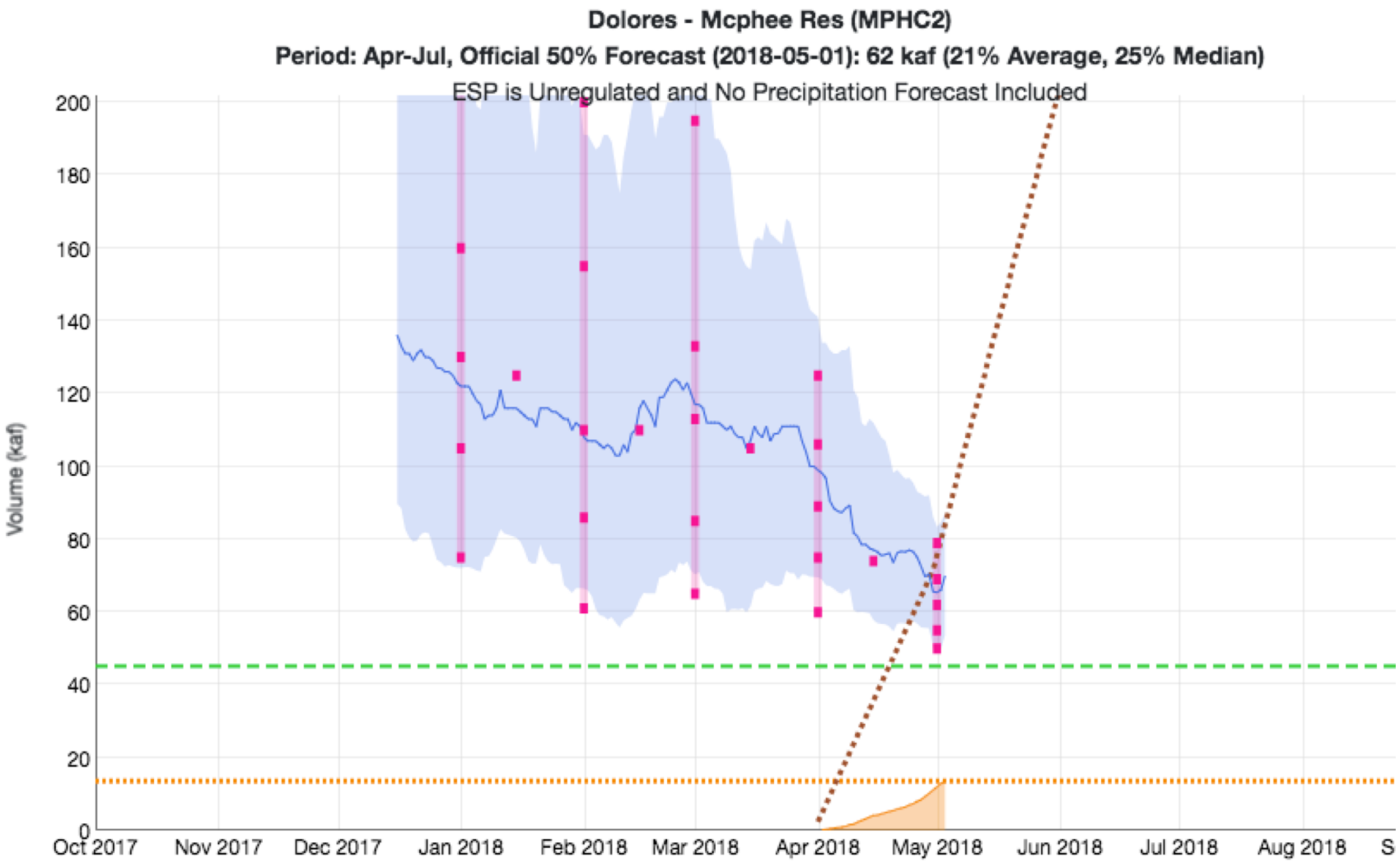
Forecast Evolution Plot: McPhee Reservoir Inflow

April-July Forecast 21% of average



Forecast Evolution Plot: McPhee Reservoir Inflow

April-July Forecast 21% of average



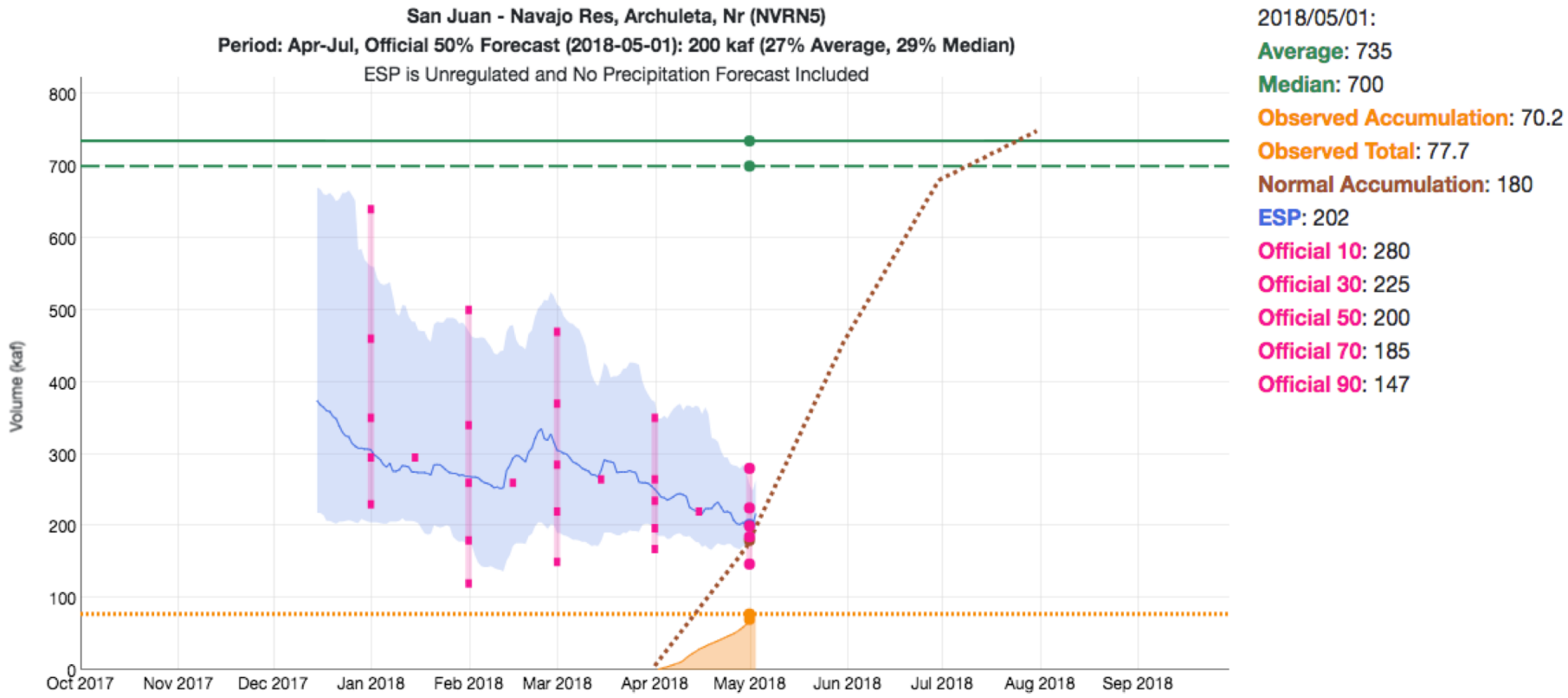
You can zoom in on these graphs for better detail, or click off the Max/Min box on the plot option menu

Forecast Evolution Plot: Navajo Reservoir Inflow

April-July Forecast 27% of average

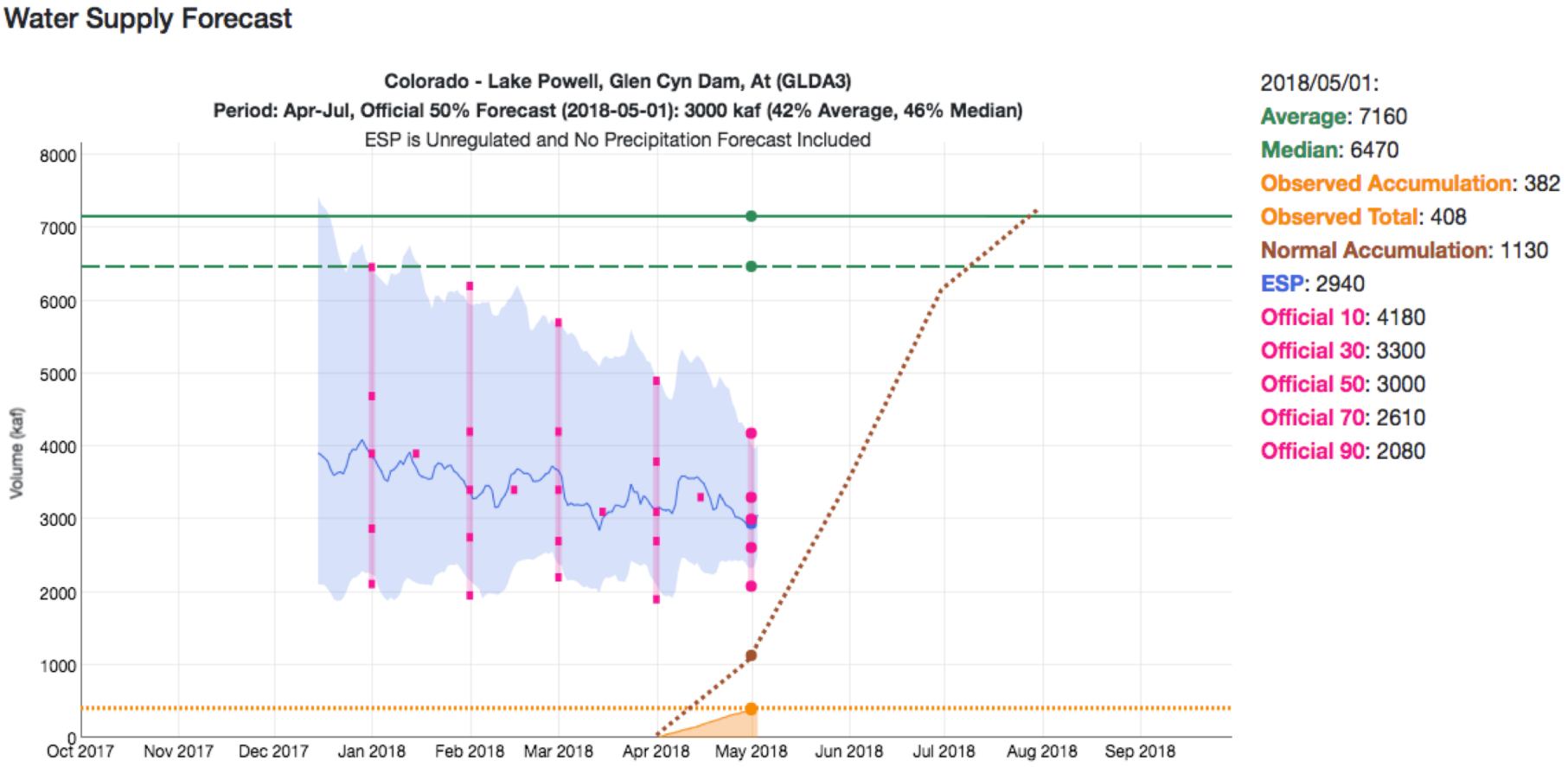
As of May 1st:
Forecast is for the 3rd lowest inflow on record (37 KAF in 2002, 116 KAF in 1977)
The maximum forecast trace is 399 KAF (54% of average) – 3% chance of occurring
The minimum forecast trace is 166 KAF (23 % of average) – 3% chance of occurring

Water Supply Forecast



Forecast Evolution Plot: Lake Powell Inflow

April-July Forecast 42% of average

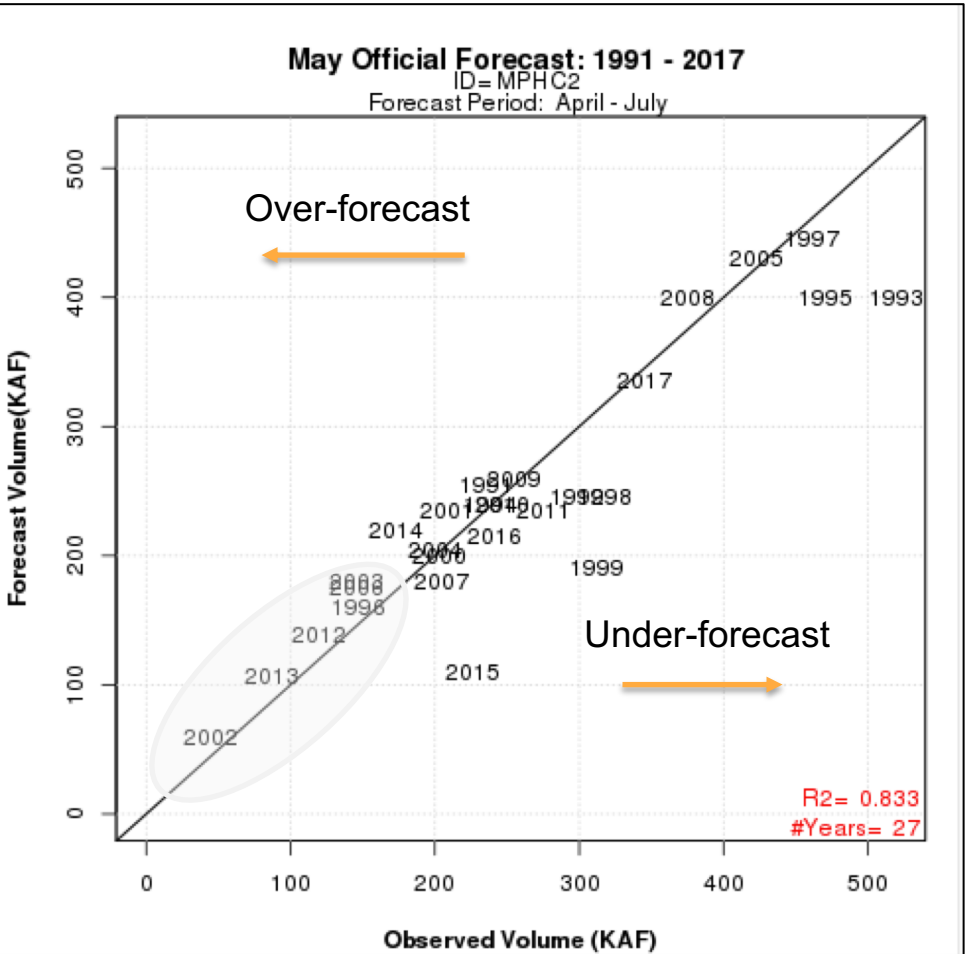


Historically, how have we forecast in low volume years (are we too high or too low?)

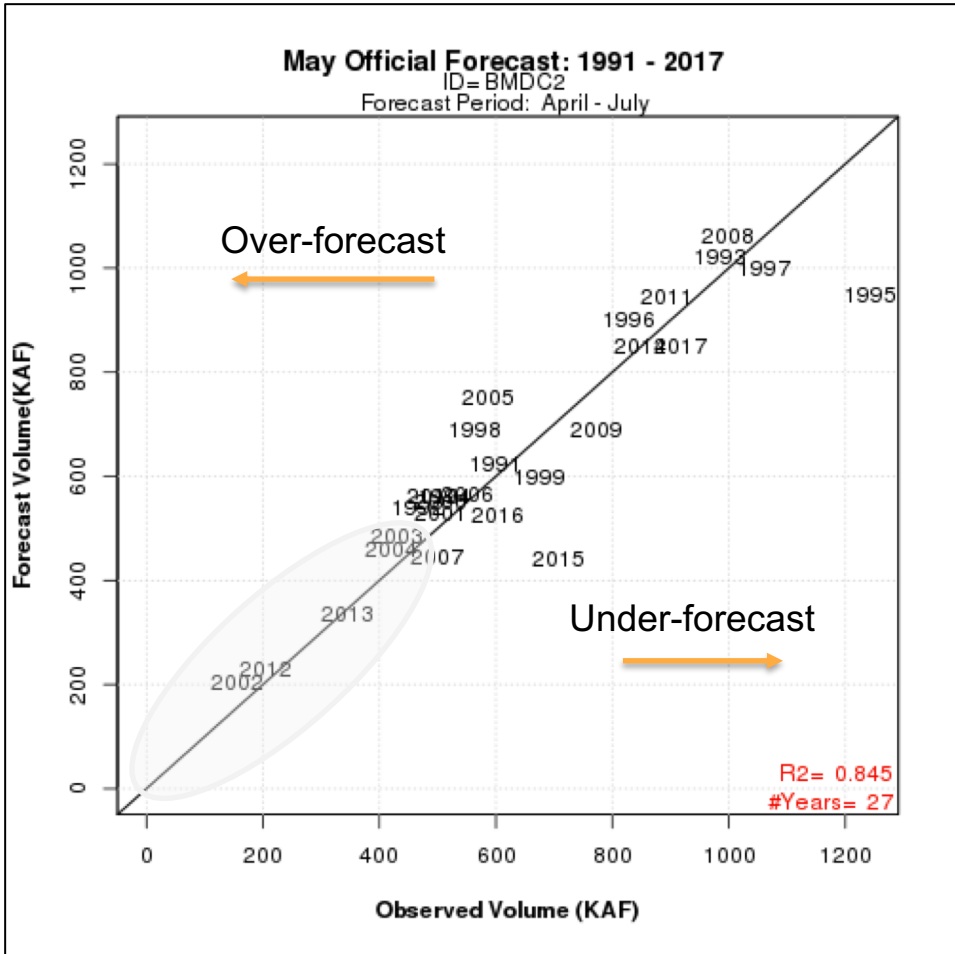
Could be many reasons we are too high/low & it can be difficult to tease out

Models struggles at extreme ends – Not enough extreme years in the calibration period
Extreme wet or dry in the future – We go with climatology ("normal" conditions) into the future
Model doesn't have certain "states" correct (high elevation snow, soil moisture)
Procedures and forecasters change

McPhee Inflow

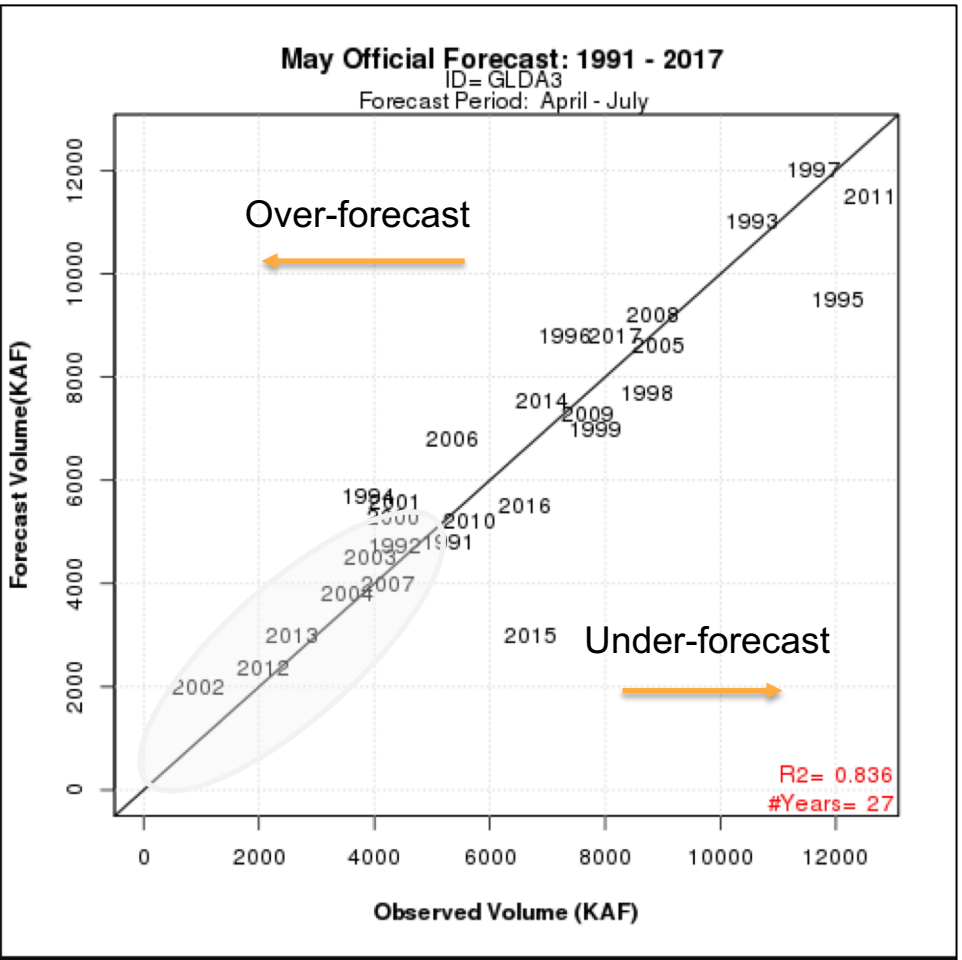


Blue Mesa Inflow

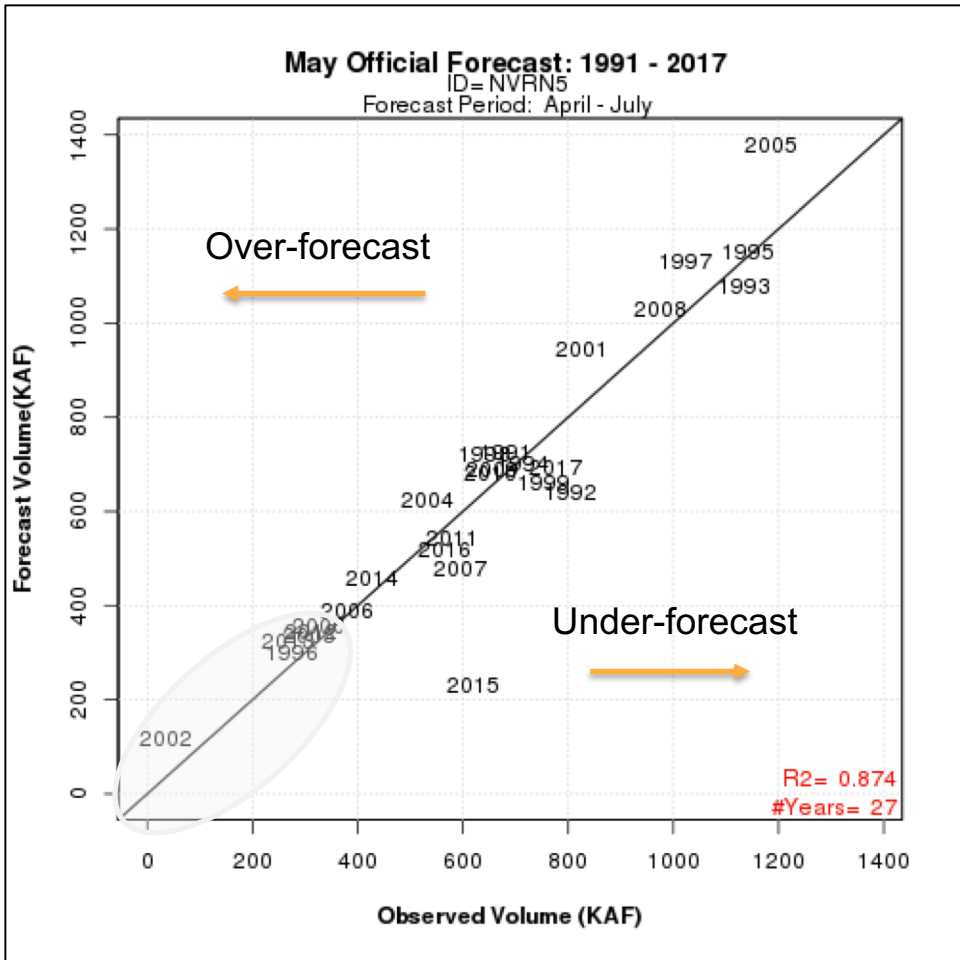


Historically, how have we forecast in low volume years

Lake Powell Inflow

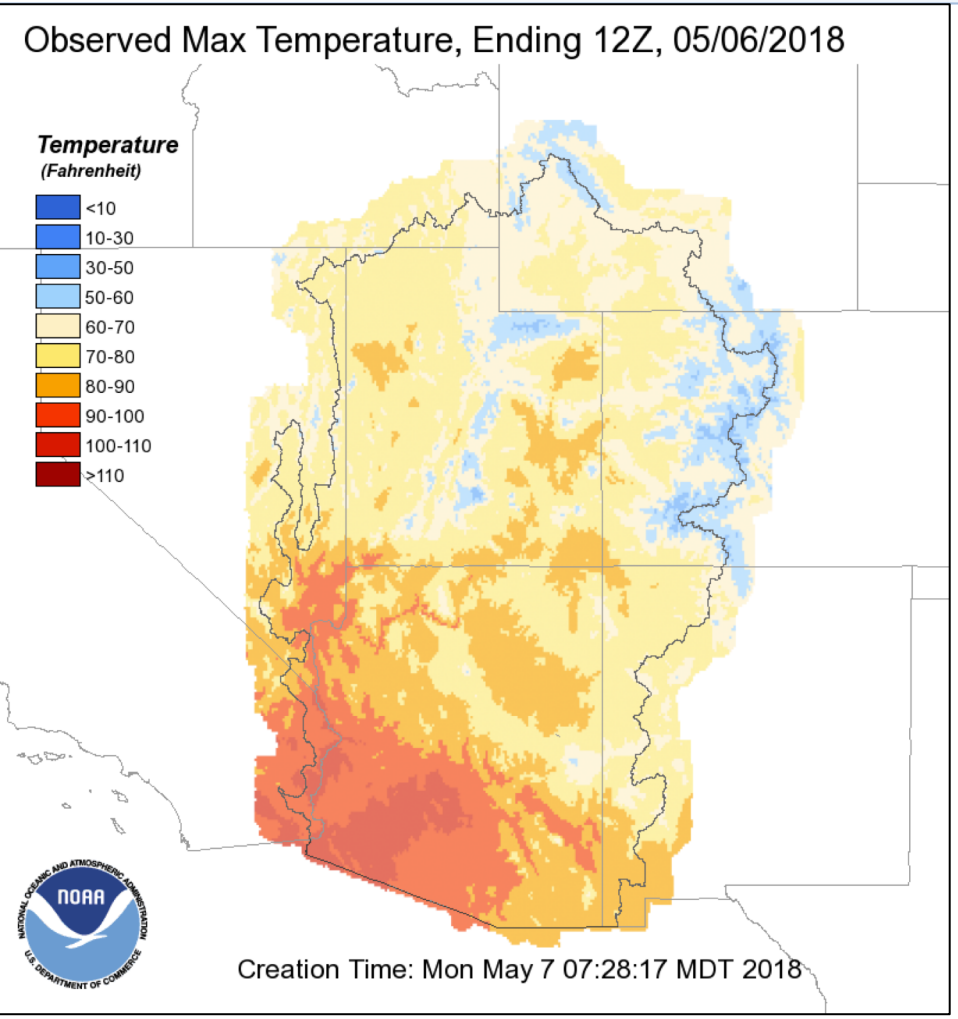


Navajo Inflow



Current Conditions – Warmed up significantly with rivers starting to react

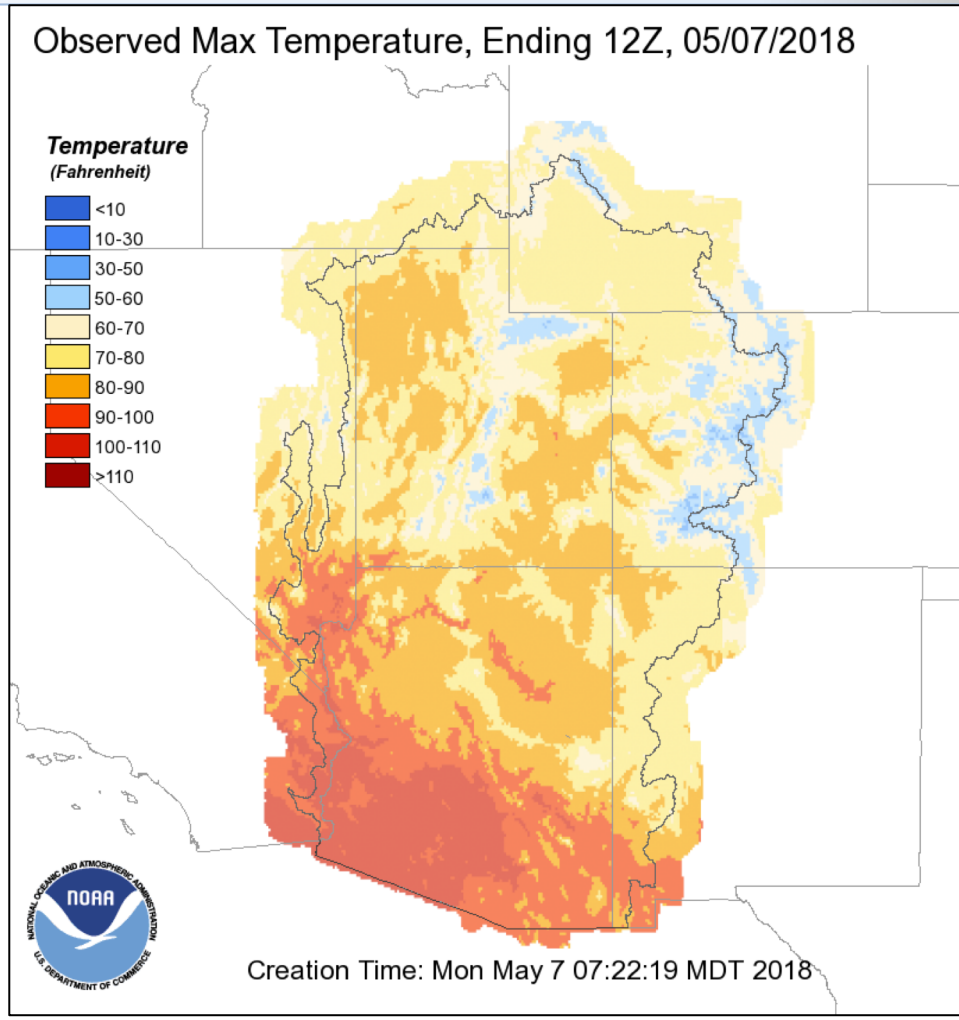
Saturday 5/5 observed temperatures



Maximum temperature departure from normal

SLC	+12
Grand Junction	+7
Craig CO	+8
Durango	+7
Big Piney WY	+11

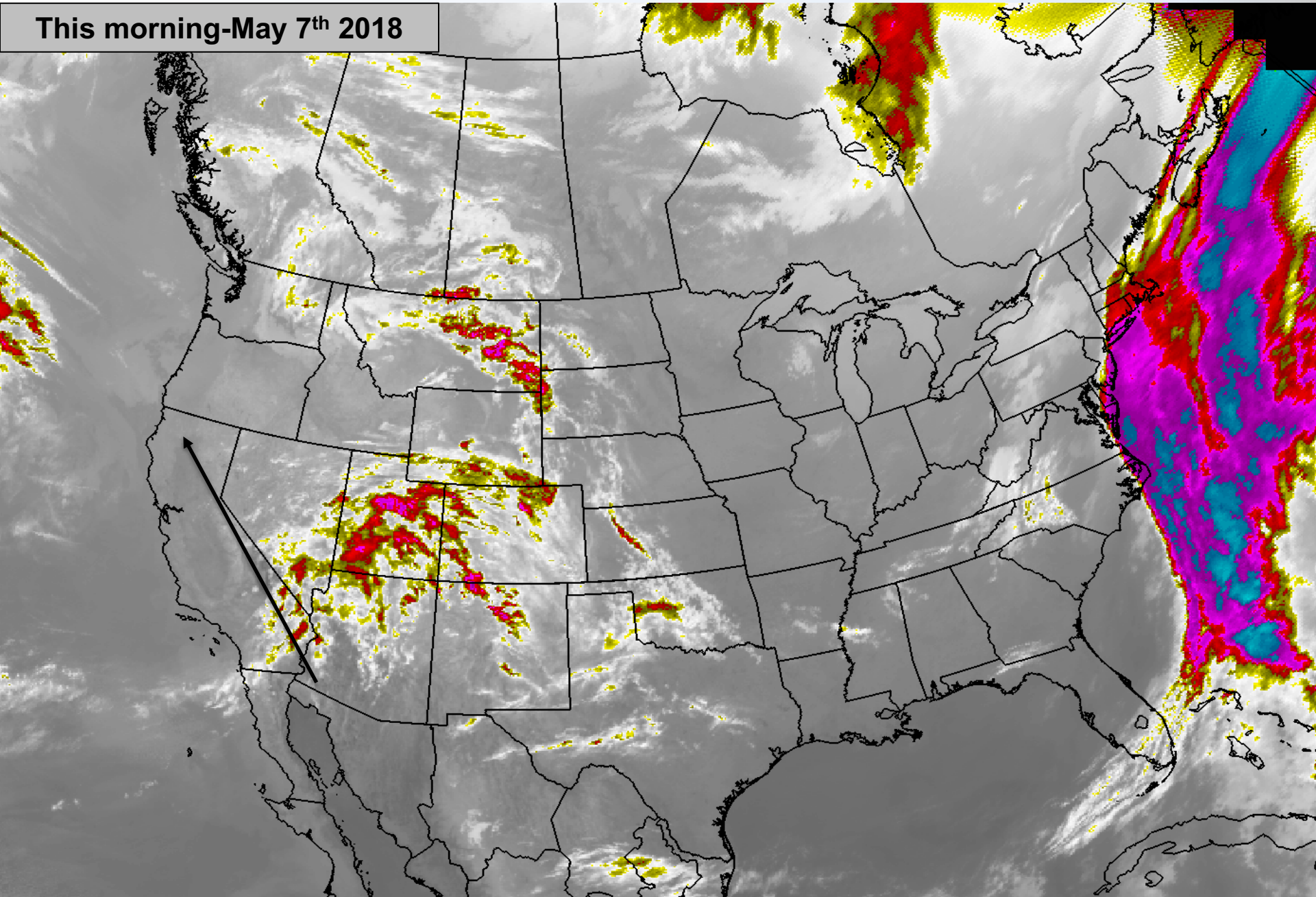
Sunday 5/6 observed temperatures



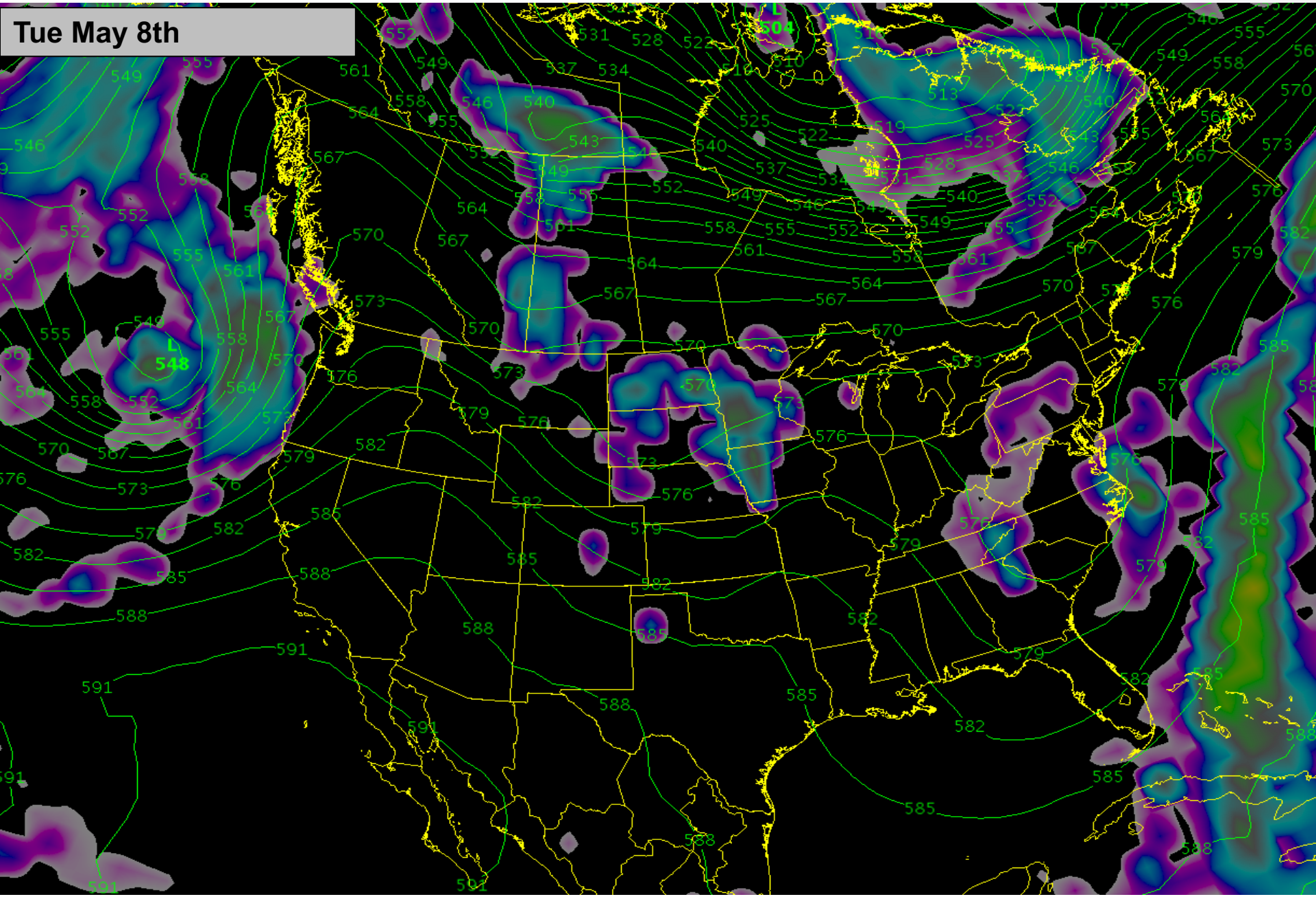
Maximum temperature departure from normal

SLC	+18
Grand Junction	+11
Craig CO	+12
Durango	+11
Big Piney WY	+16

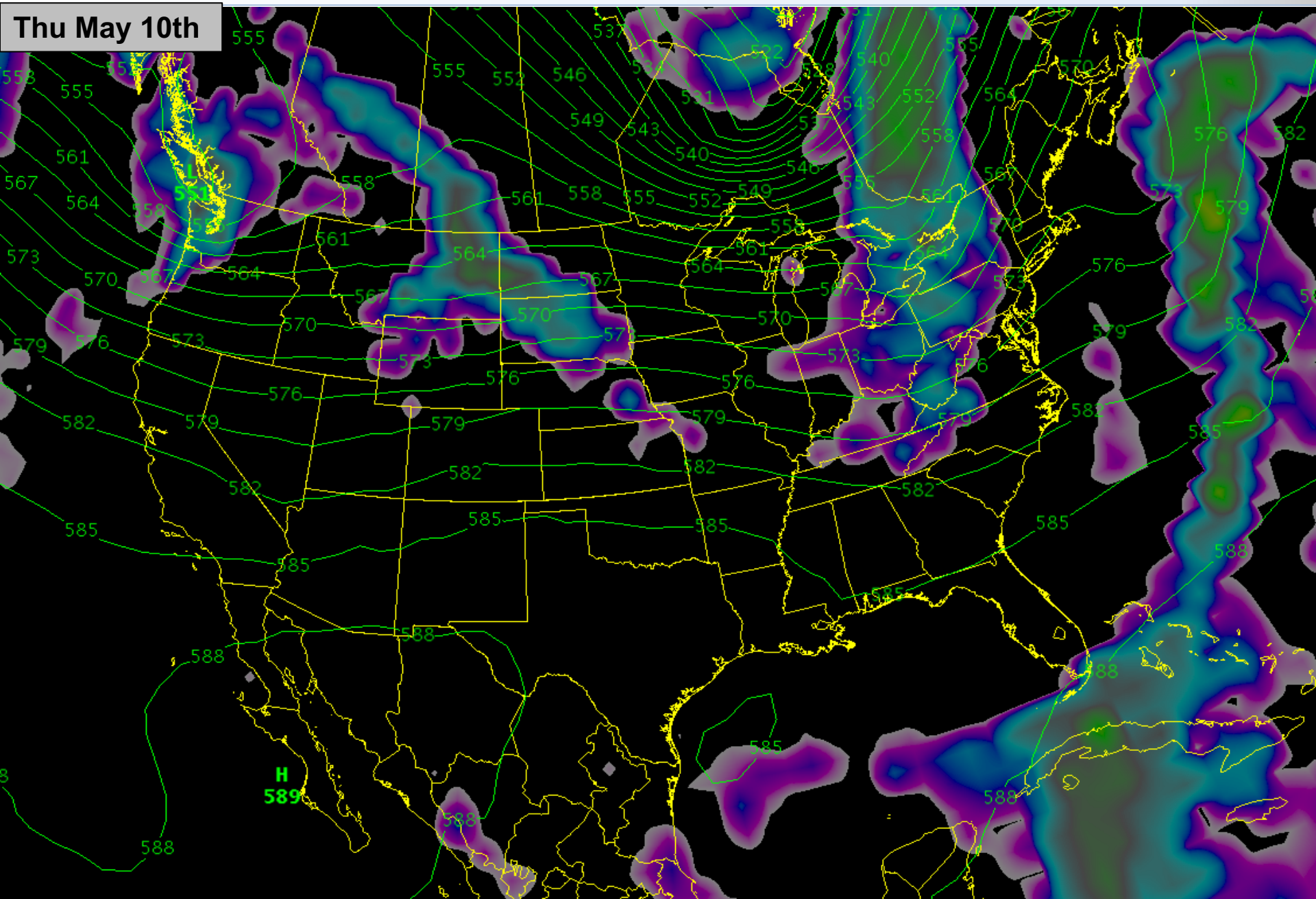
Weak storm system moving through the northern Rockies today. Temperatures a few degrees cooler but still above average. No precipitation threat, primarily a cloud storm.



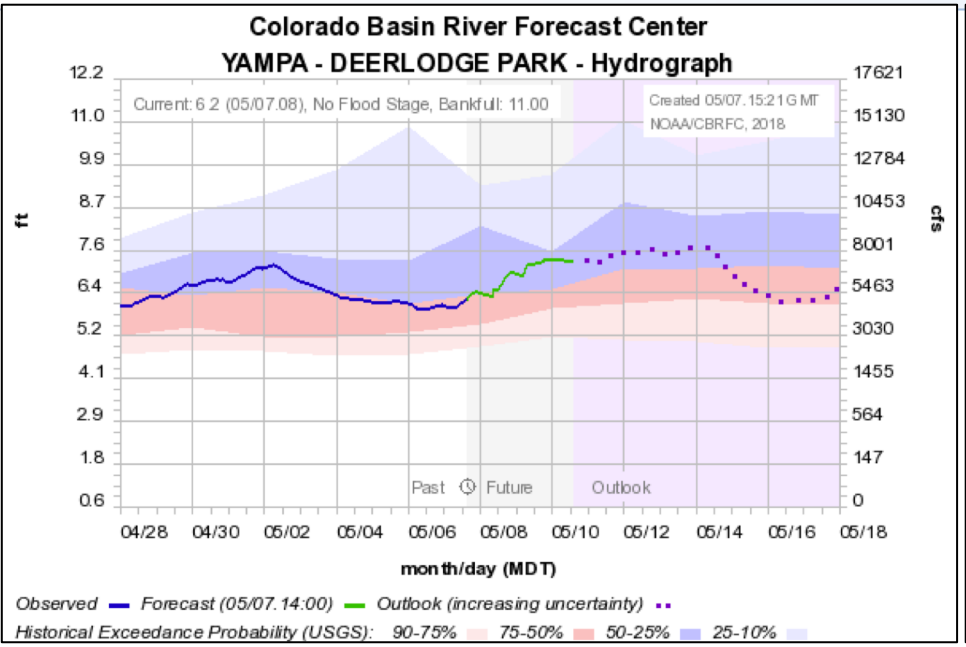
Strong ridge for midweek. This will bring temperatures 10-15+ degrees above average for many areas – initiating the spring seasonal peak flow for many locations

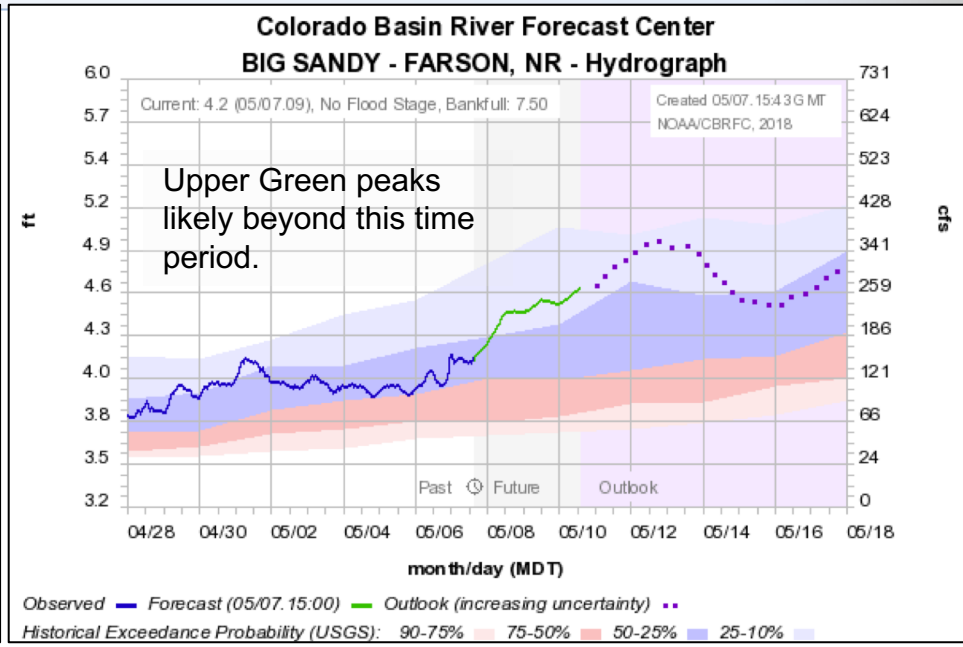


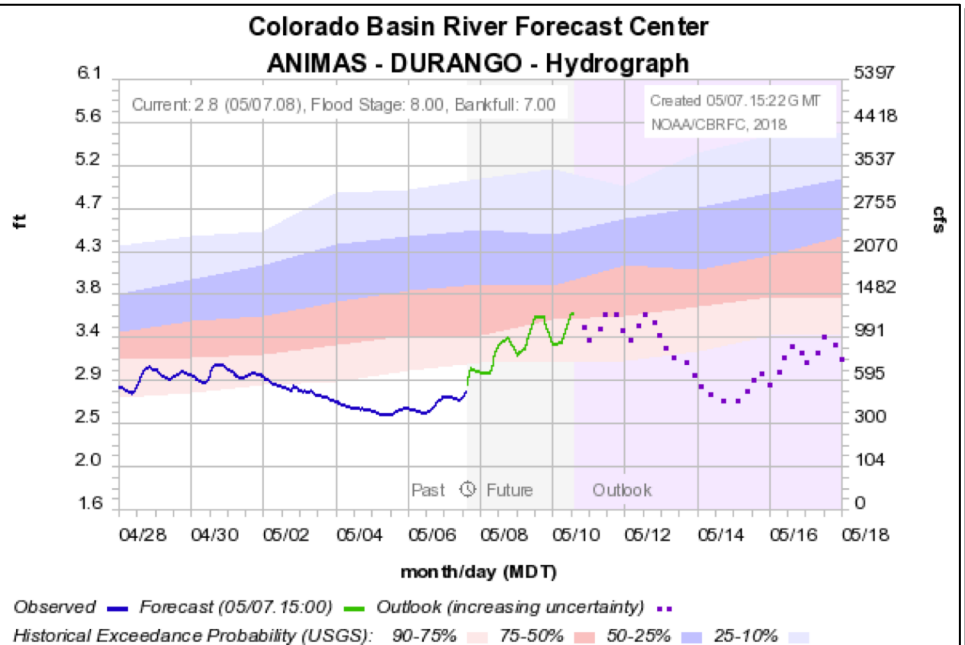
The ridge flattens but above average temperatures persist into the end of the week

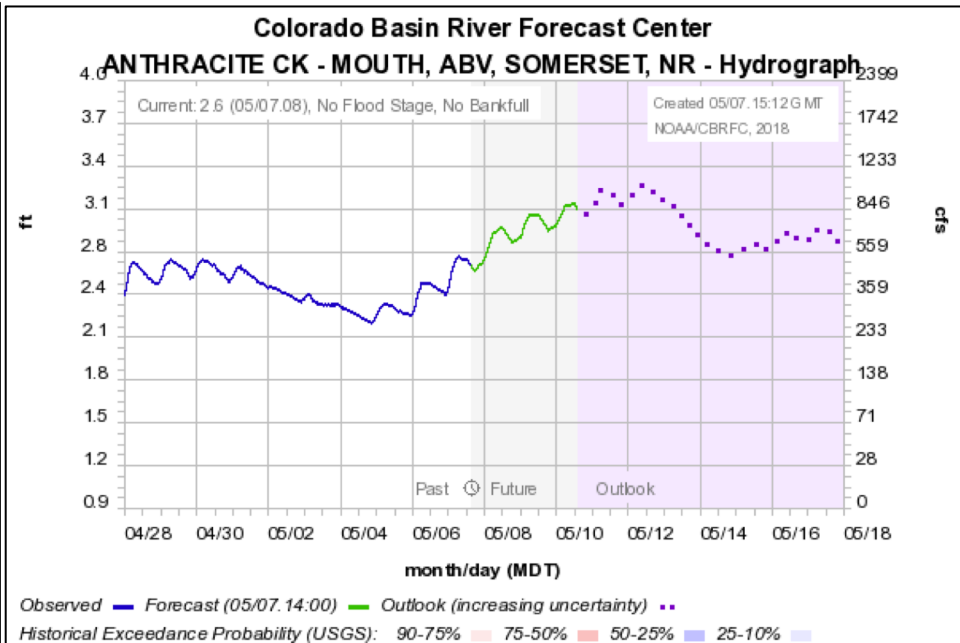


Models suggest many streams will see their seasonal peak within the next 7 days

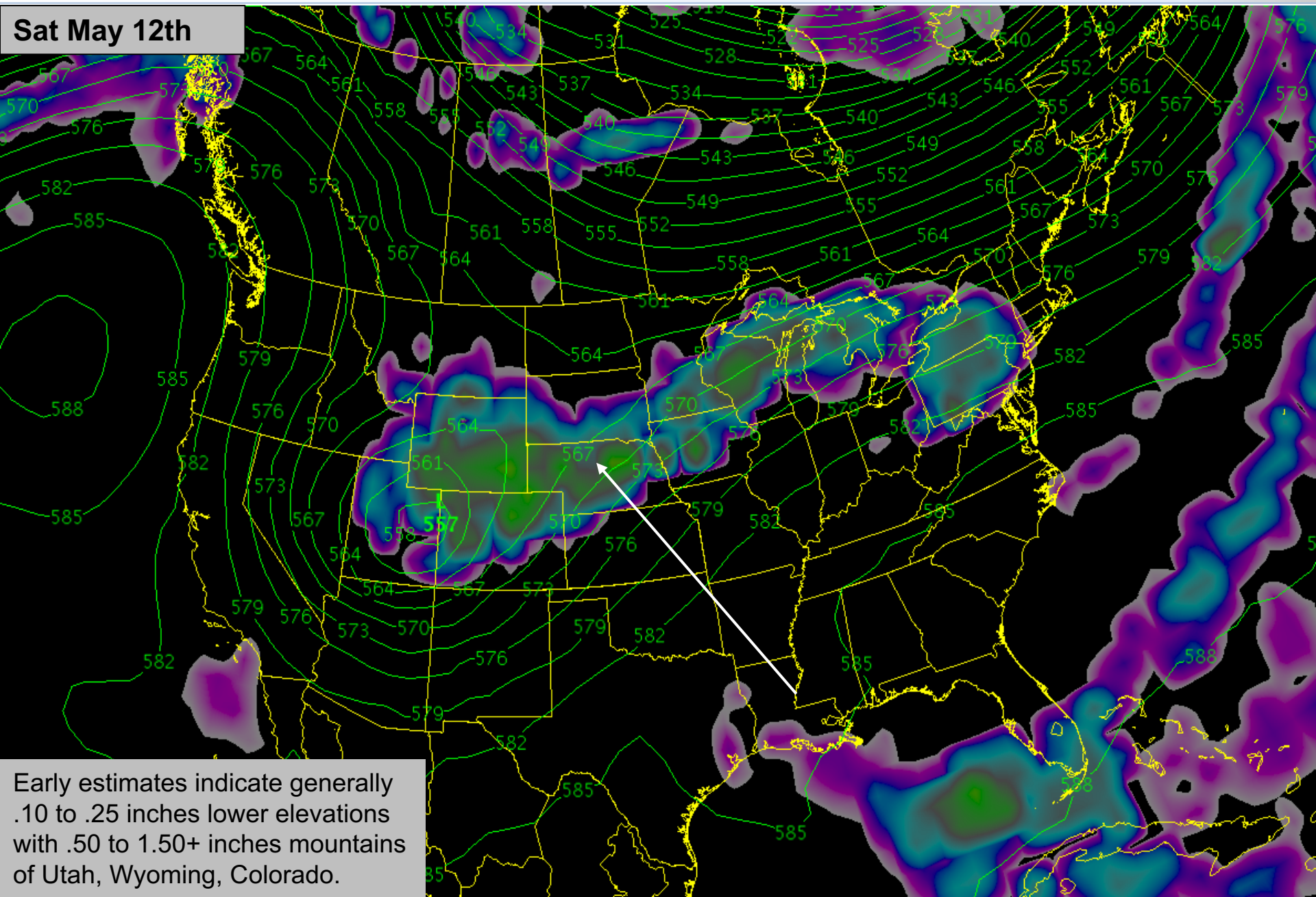




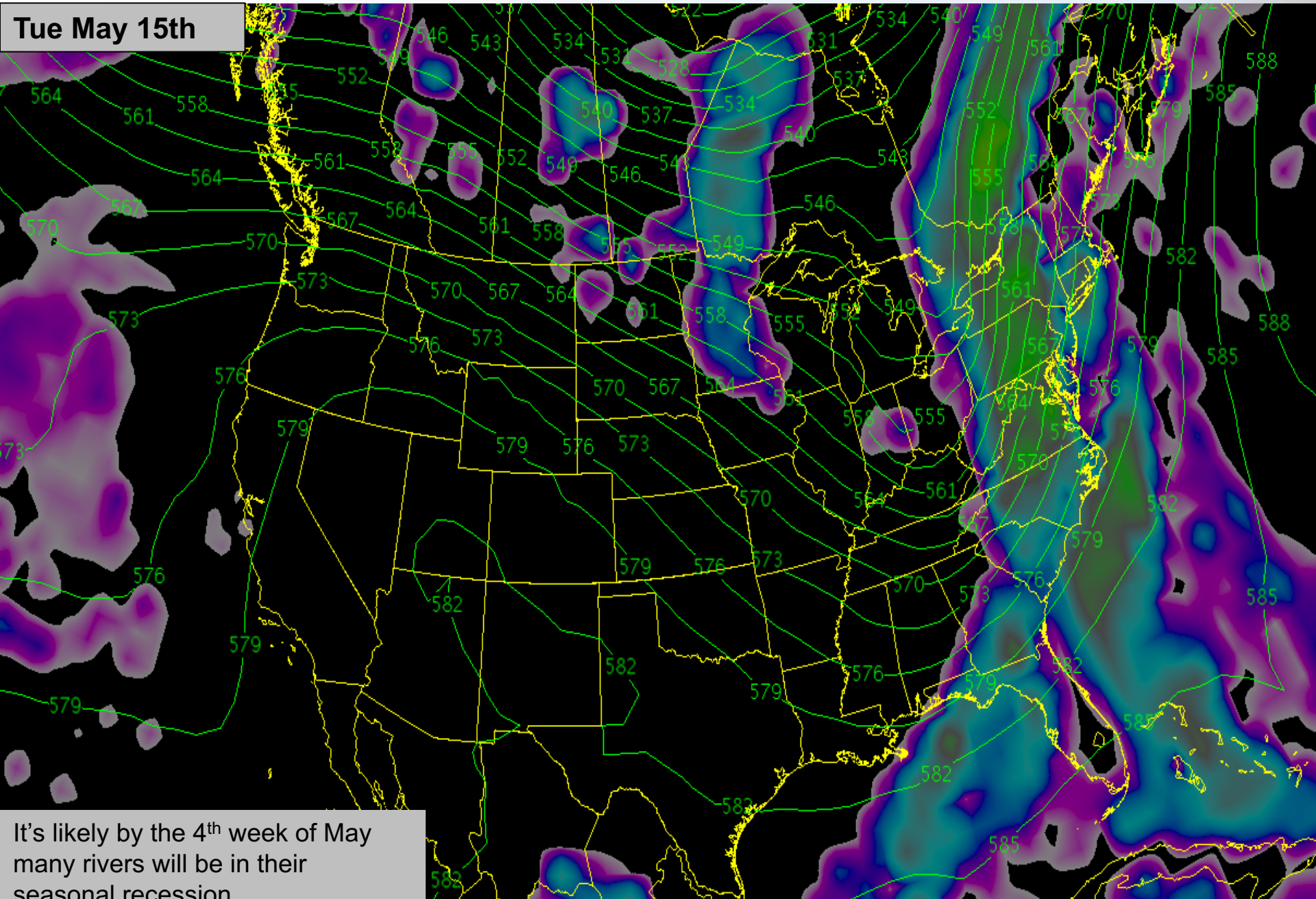




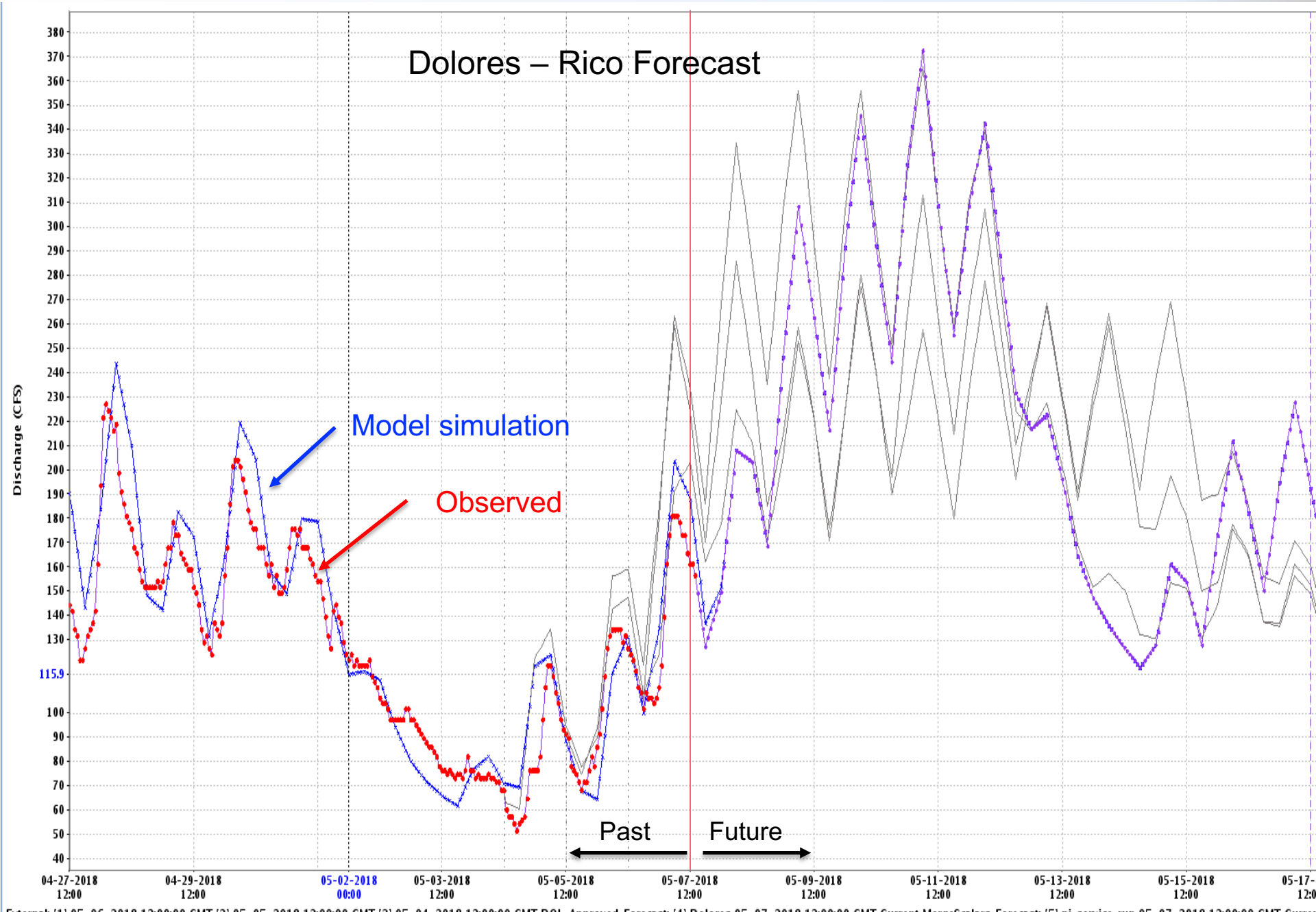
Models bring a closed low pressure into the area for the weekend. Below average temperatures and precipitation likely



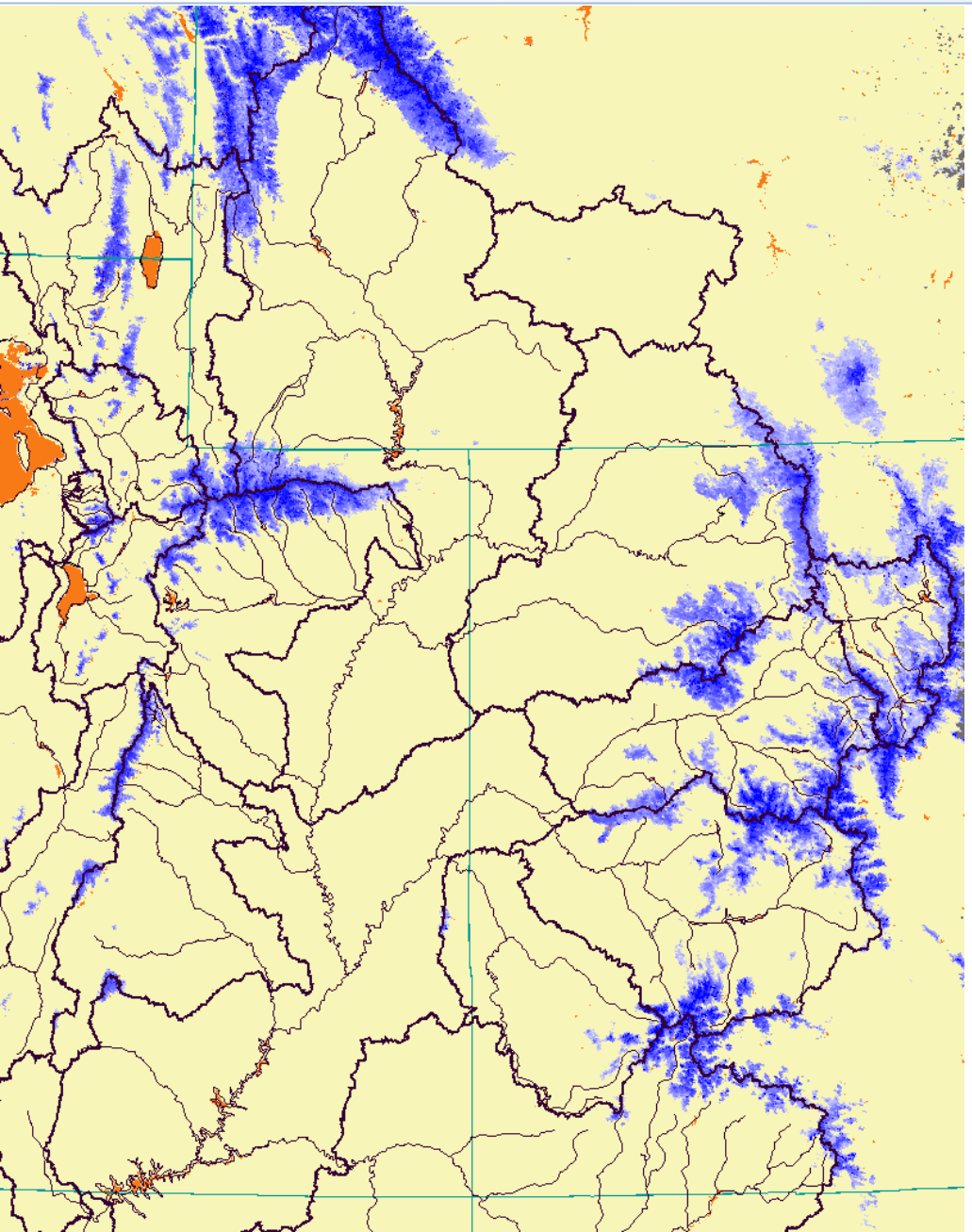
Ridging (transitory ridge) and warm temperatures return. Rivers will again rise but many may not reach levels observed this week due to lack of remaining snowpack.



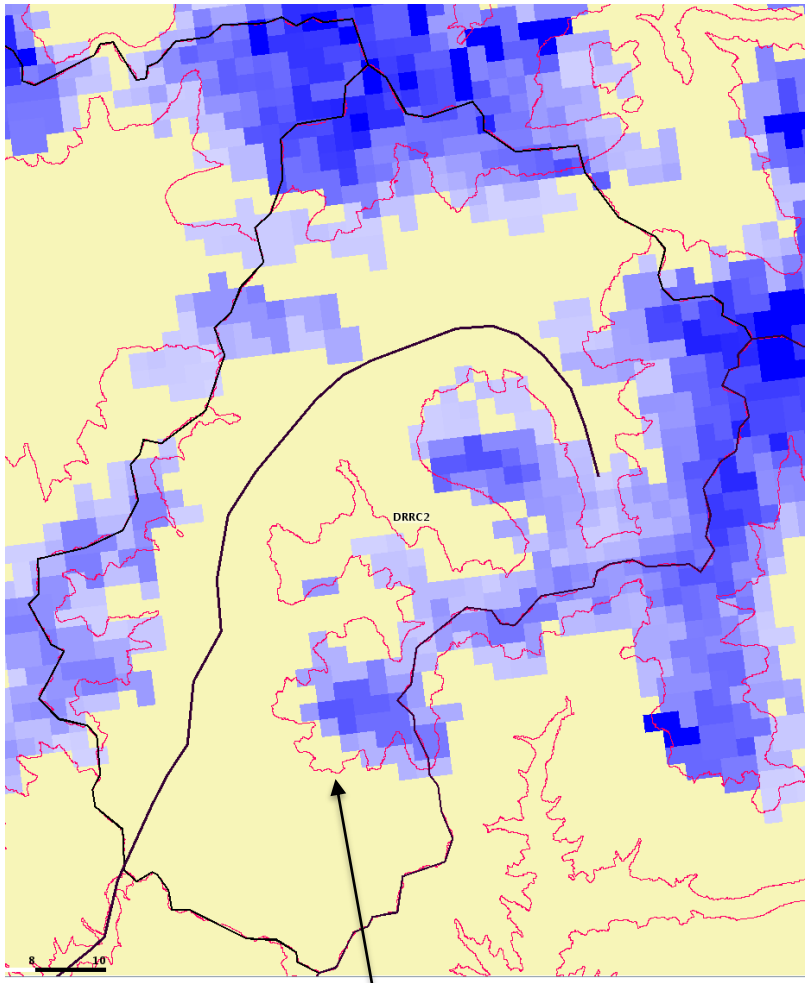
Water supply forecast season is winding down. So what do we monitor from this point forward ?
How well we are simulating current streamflow. Tells us something about our model snow states.



SNOTELS may be out but snow still exists at high elevations – Satellite data is utilized to monitor extent of higher elevation snow and verify snow states within our model.



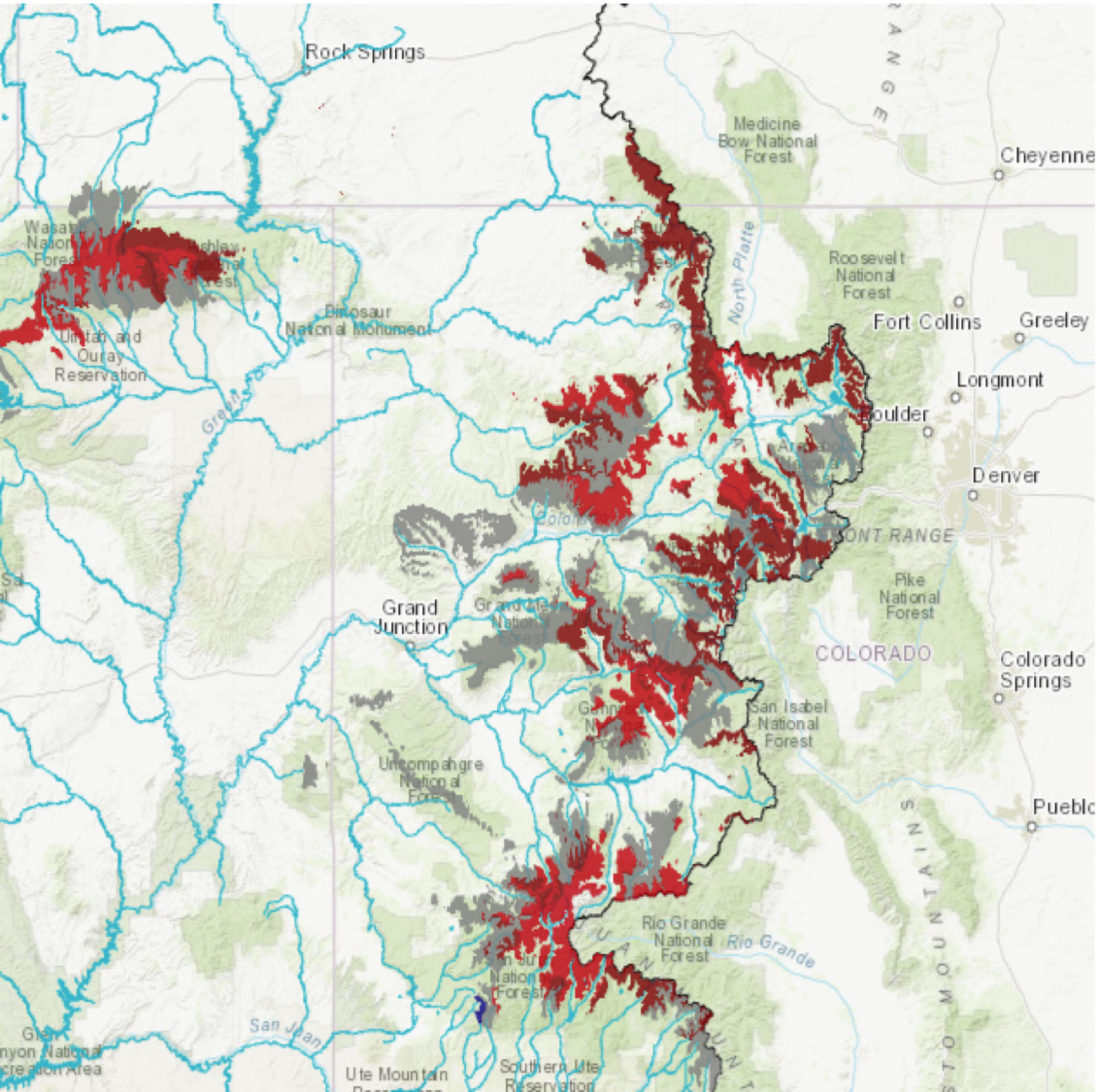
Dolores at Rico forecast basin

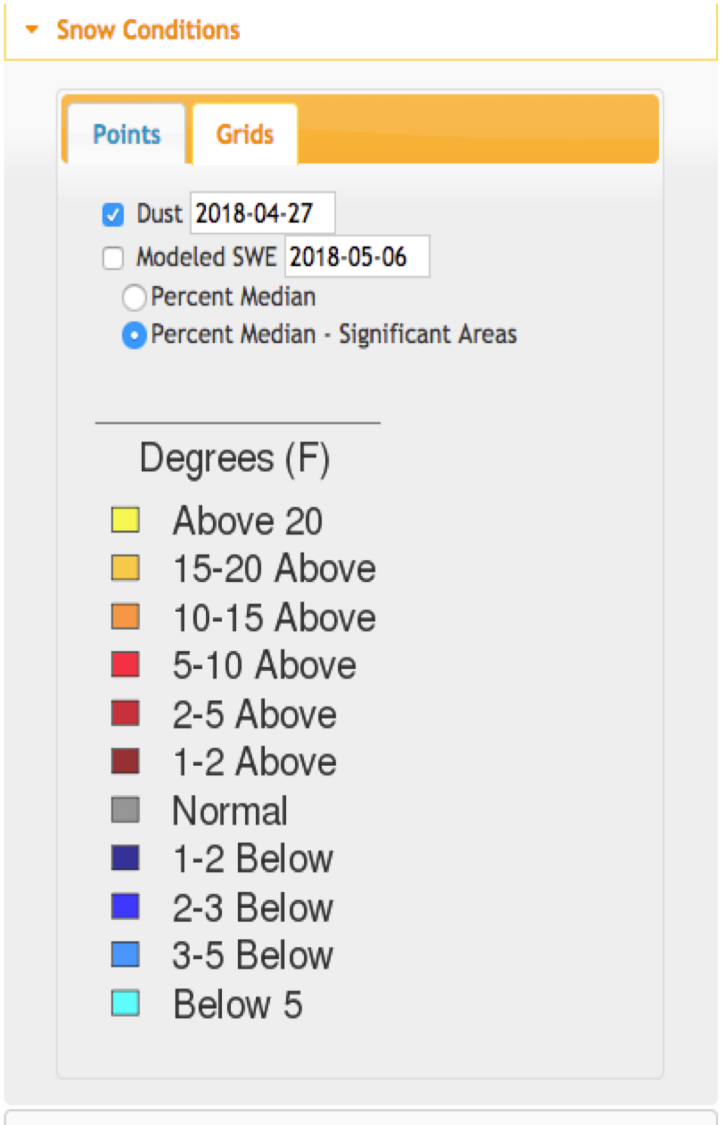


Model elevation boundaries in red

Satellite snow on 4/26 2018

Satellite – Information about dust is also available and as a temperature departure. We can adjust the temperatures upward in the model to accelerate snow melt if necessary





Summary

Outside of the upper Green River Basin in Wyoming an extreme year, on the dry side, is widespread across the Colorado River Basin. This follows a very wet year last season.

Seasonal peaks are anticipated in many locations over the next week. Some rebound in streamflow is likely in the May 15-25th time frame but these peaks may be near or less than what is observed this week (exception Upper Green Basins).

Most streams will likely be in seasonal recession by the last week of May.

At this point we continue to monitor the runoff, analyze and quality control meteorological guidance. A big driver of the near term streamflow are temperature forecasts. We try to get the best forecast information into the model.

Adjustments to model states may be necessary to correct streamflow simulations. This can impact our seasonal recession forecasts as well as late season (mostly monthly) water supply forecast updates. Usually these are minor and in the correct direction.

Great Basin / Utah webinar briefing at 1:30 pm MDT today.

Feedback is welcome regarding these briefings.

We will be back in the fall with a review of the season and forecast verification.

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