

March 2017 Colorado River Basin Water Supply Briefing

Mar 7, 2017

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Colorado Basin River Forecast Center
National Weather Service
NOAA

Please mute your phone
until ready to ask questions



Today's Presentation

February weather impacts:

Snowpack, soils, & water supply outlook

The latest snowpack conditions

Significant with some at record levels for early March

2017 water supply forecasts overview

Some forecasts are at record levels

March forecast error – an improvement over February?

March is a pivotal month

Upcoming weather – Potential impacts to water supply forecasts

Contacts & Questions

*** Please mute your phone until ready to ask questions ***

February Weather

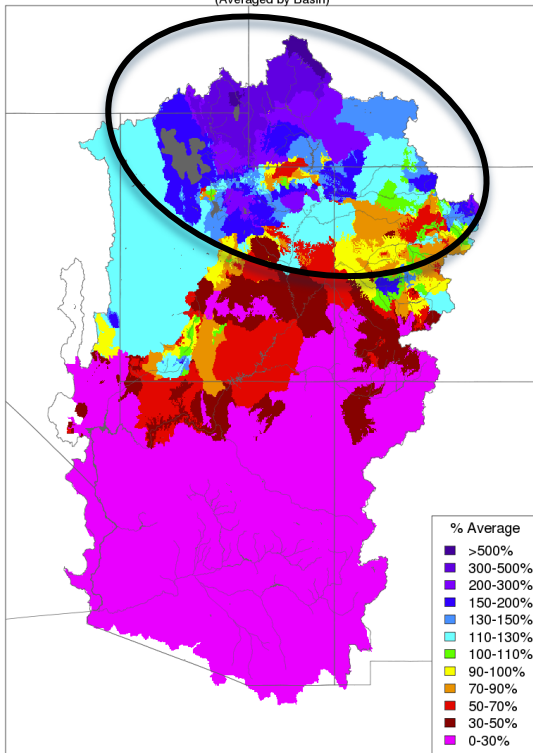
Precipitation distribution over the month of February

Early February storm focused on northern areas (Duchesne, Upper Green River Basins)

The southern 2/3 of the CBRFC forecast area was below average for most of February

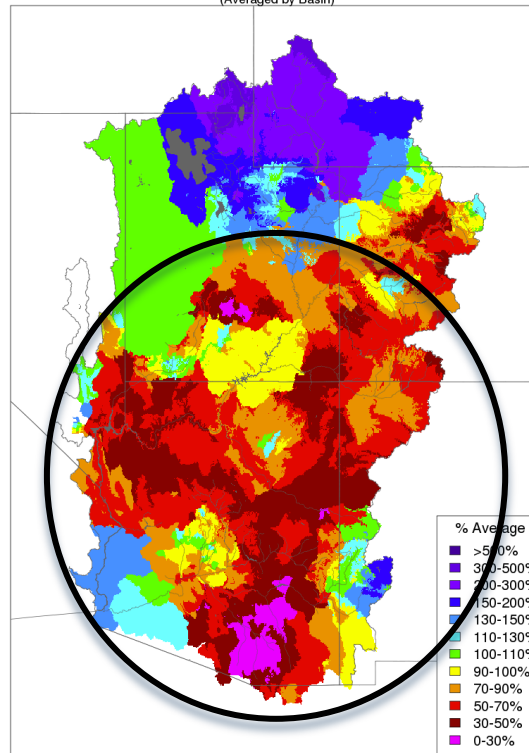
End of the month storm benefited the Lower Colorado River Basin & San Juan Basin

Month to Date Precipitation - February 12 2017
(Averaged by Basin)



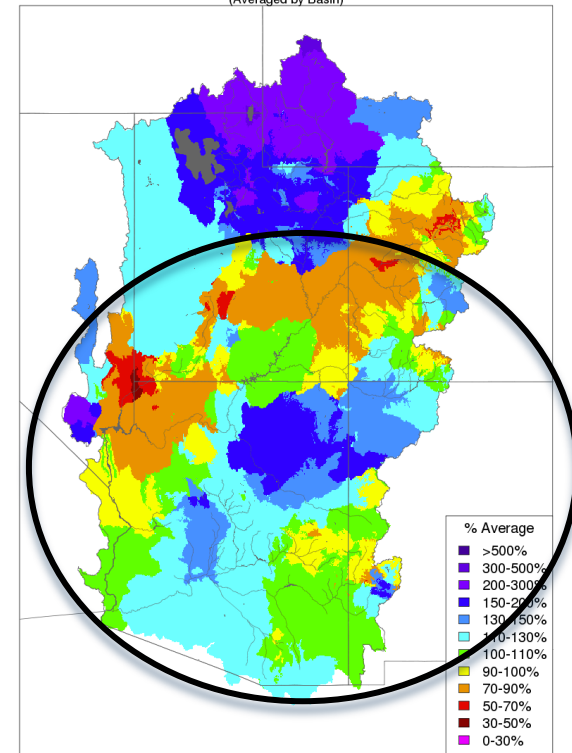
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbafc.noaa.gov

Month to Date Precipitation - February 25 2017
(Averaged by Basin)



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

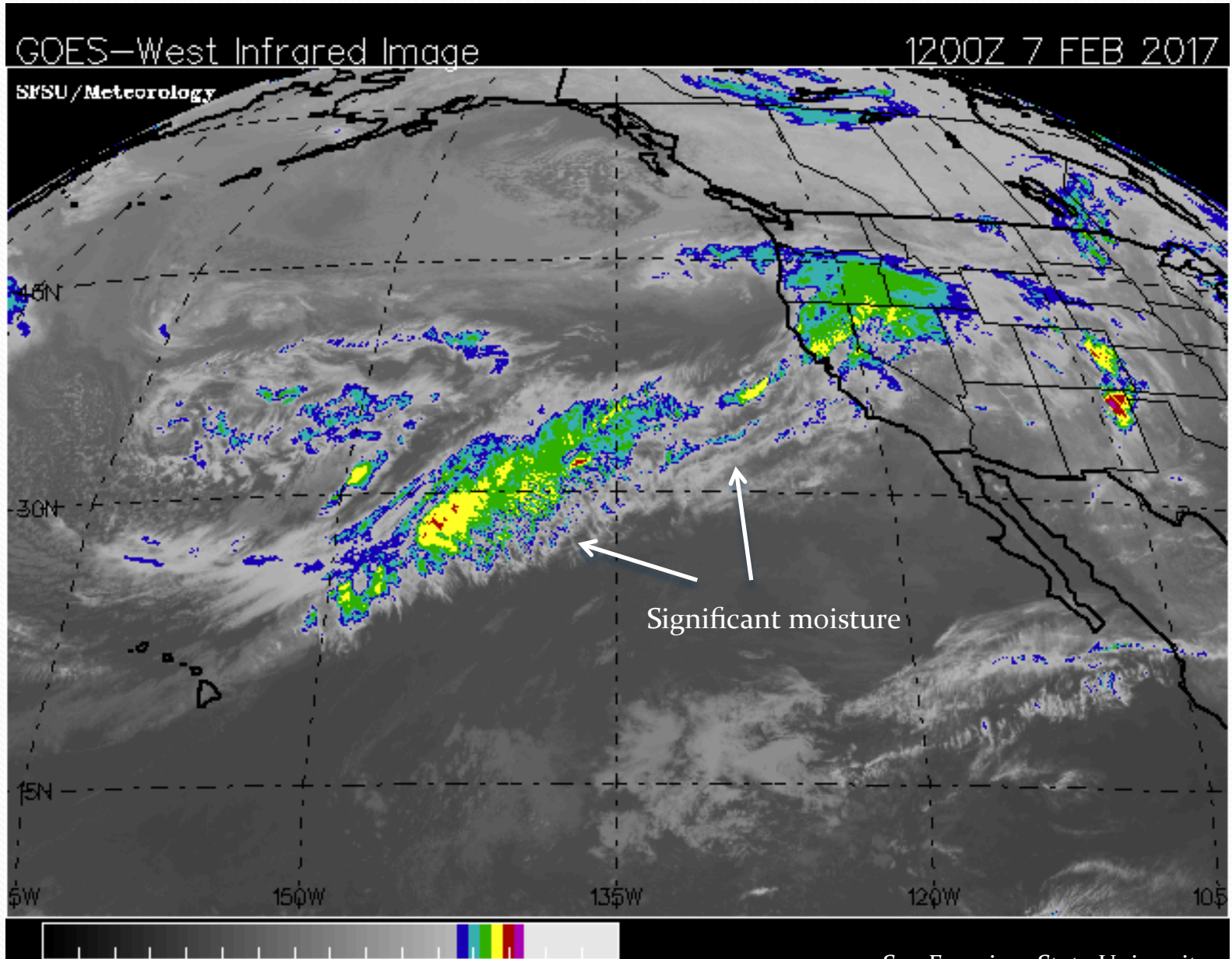
Monthly Precipitation - February 2017
(Averaged by Basin)



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

February Weather

We've seen this before – Atmospheric river

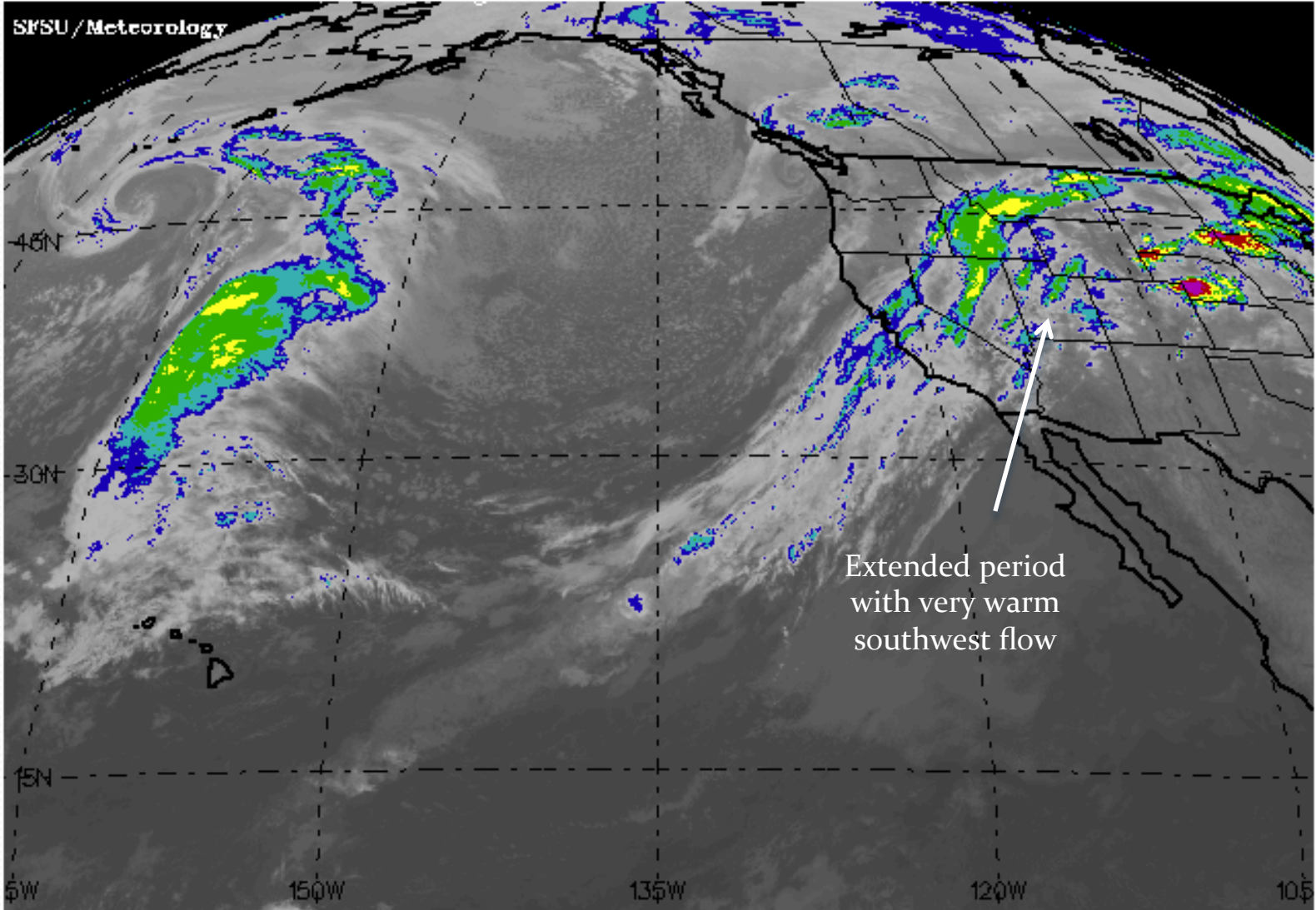


February Weather

GOES—West Infrared Image

1400Z 10 FEB 2017

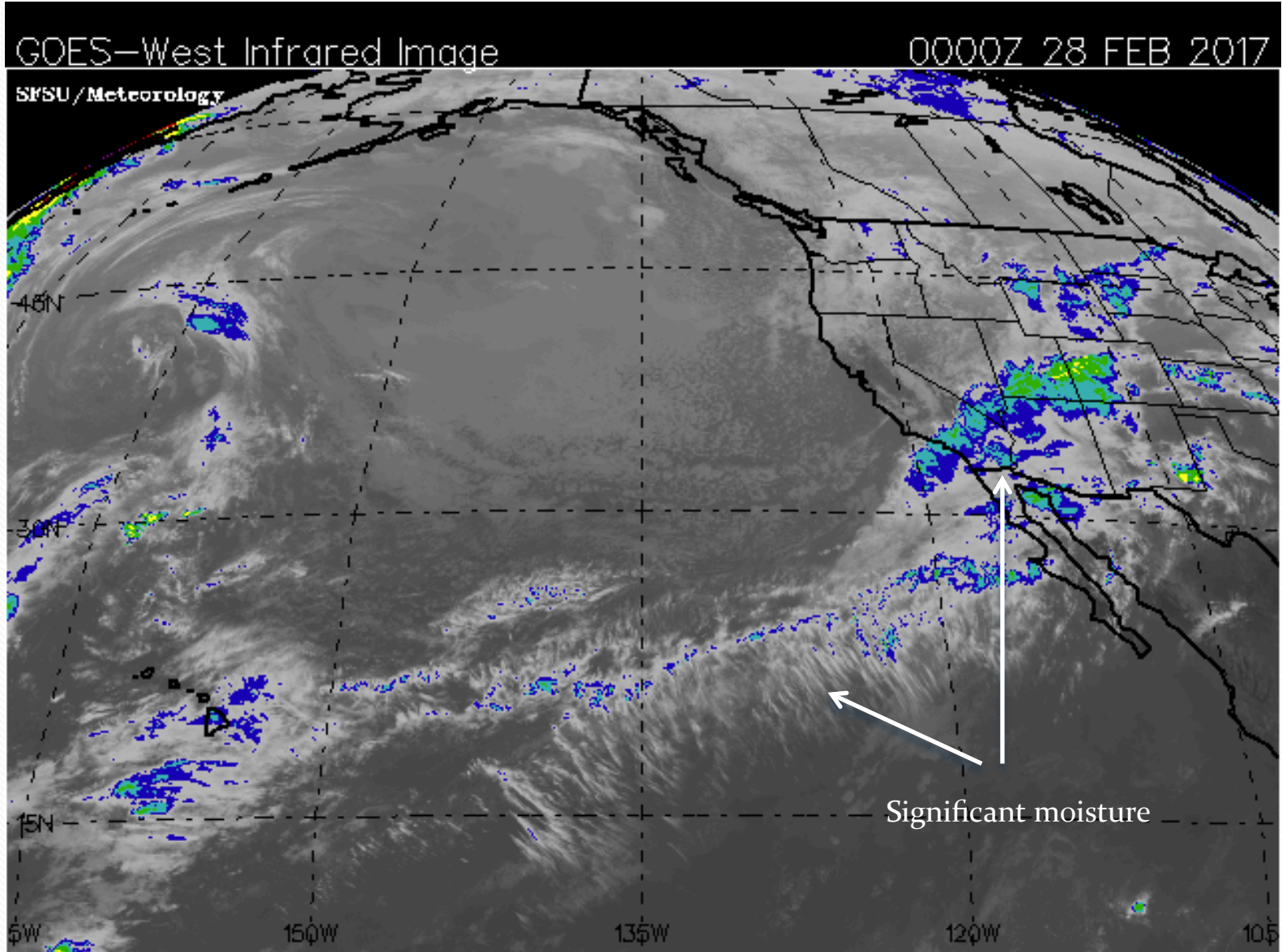
SFSU/Meteorology



Extended period
with very warm
southwest flow



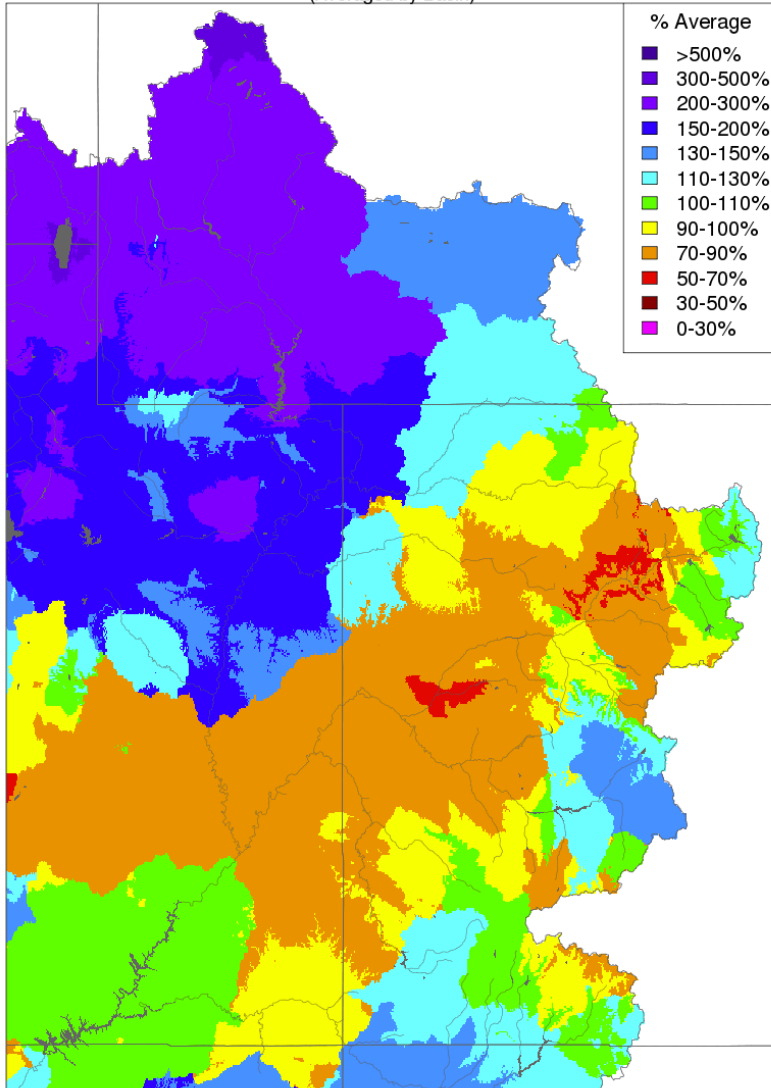
February Weather



February Weather

Precipitation distribution by major river basins

Monthly Precipitation - February 2017
(Averaged by Basin)



Upper Colorado River Basin Feb 2017 Precipitation (% average)

Upper Green: 225%

Yampa/White: 95%

Duchesne: 165%

Colorado Mainstem: 95%

Gunnison: 100%

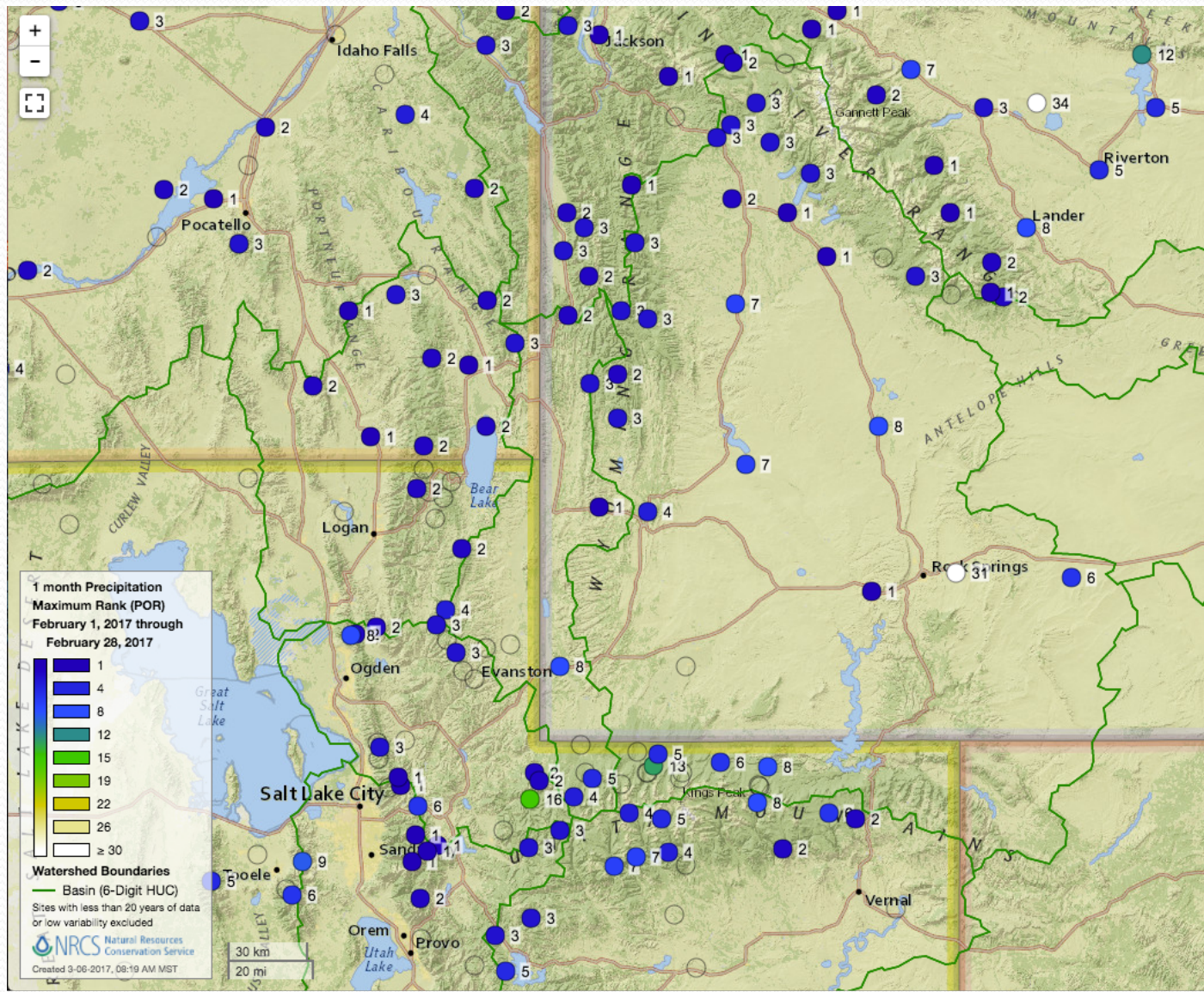
Dolores: 110%

San Juan: 110%

February Weather

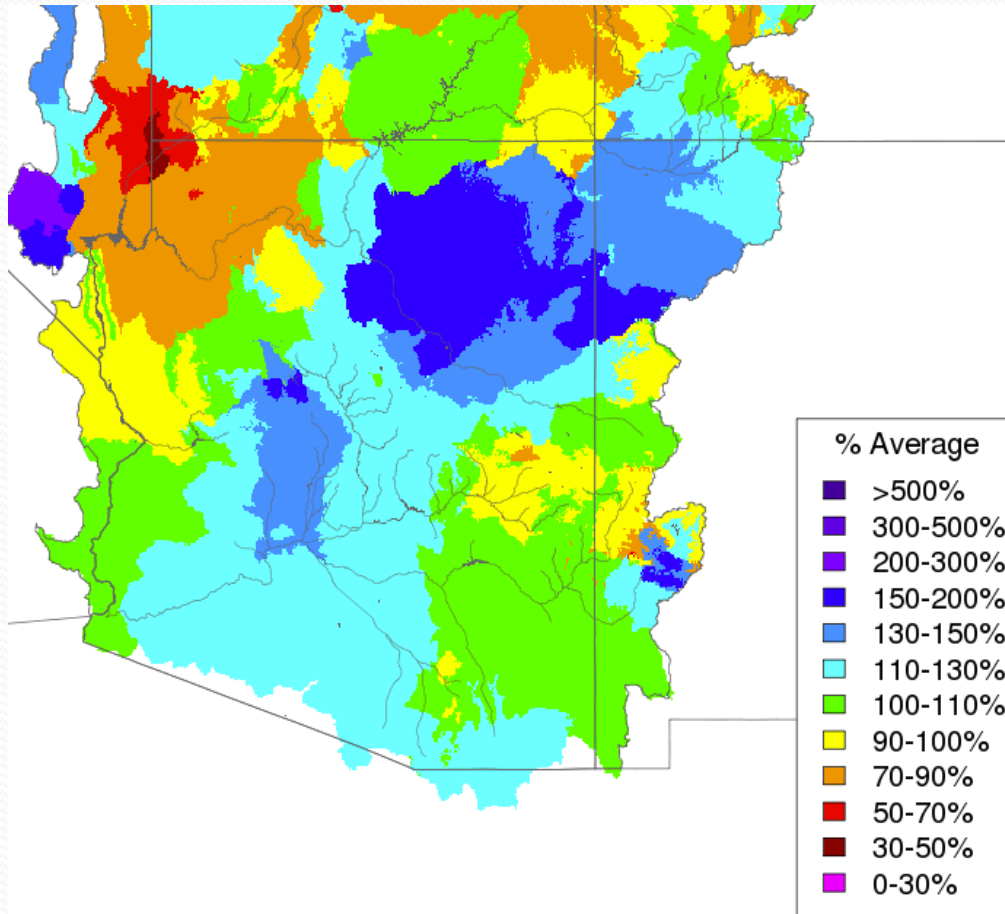
Once again impressive precipitation in the Green River Basin

Precipitation rankings for February 2017



February Weather

Precipitation distribution by major river basins

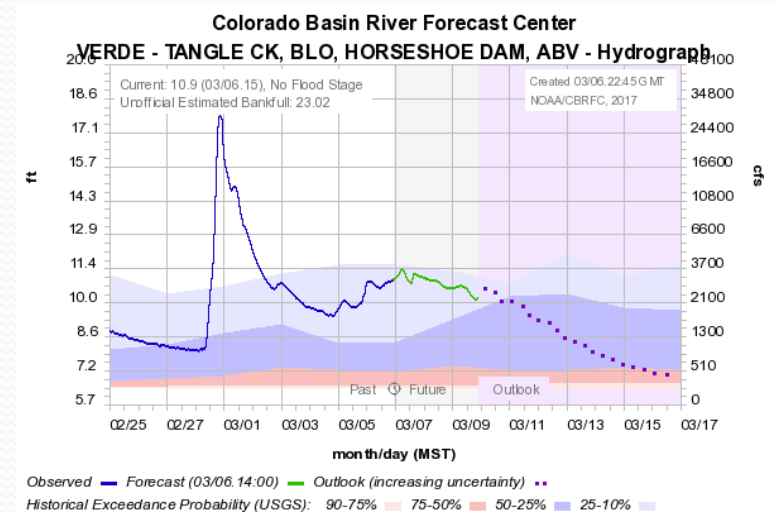


Lower Colorado River Basin Feb 2017 Precipitation (% average)

Little Colorado: 110%

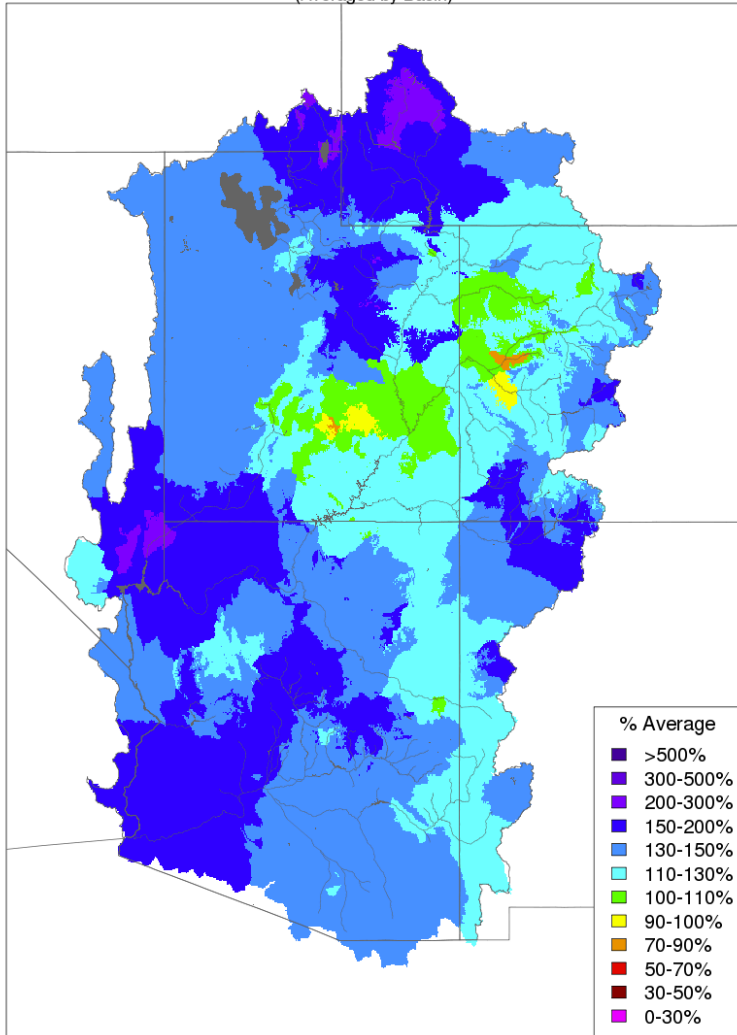
Salt: 110%

Gila: 95%



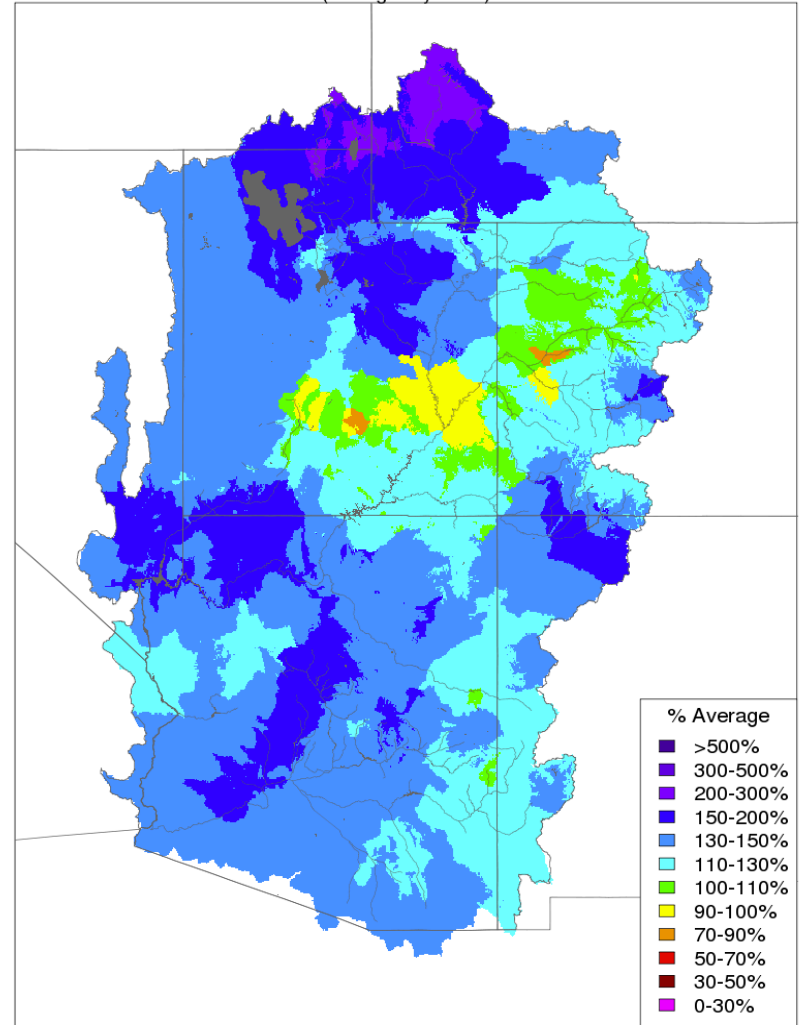
Water Year Precipitation

Water Year Precipitation, October 2016 - January 2017
(Averaged by Basin)

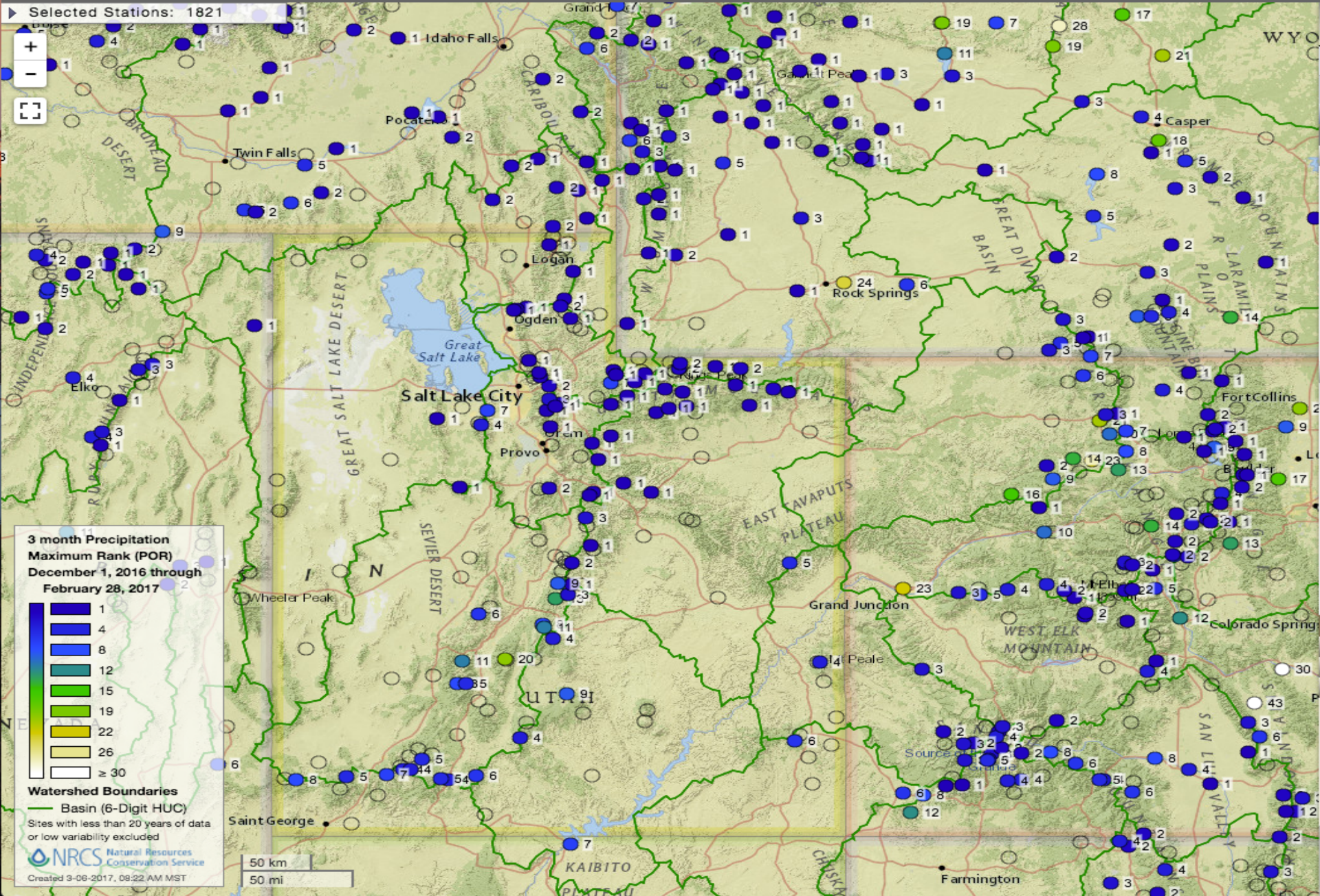


Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Water Year Precipitation, October 2016 - February 2017
(Averaged by Basin)

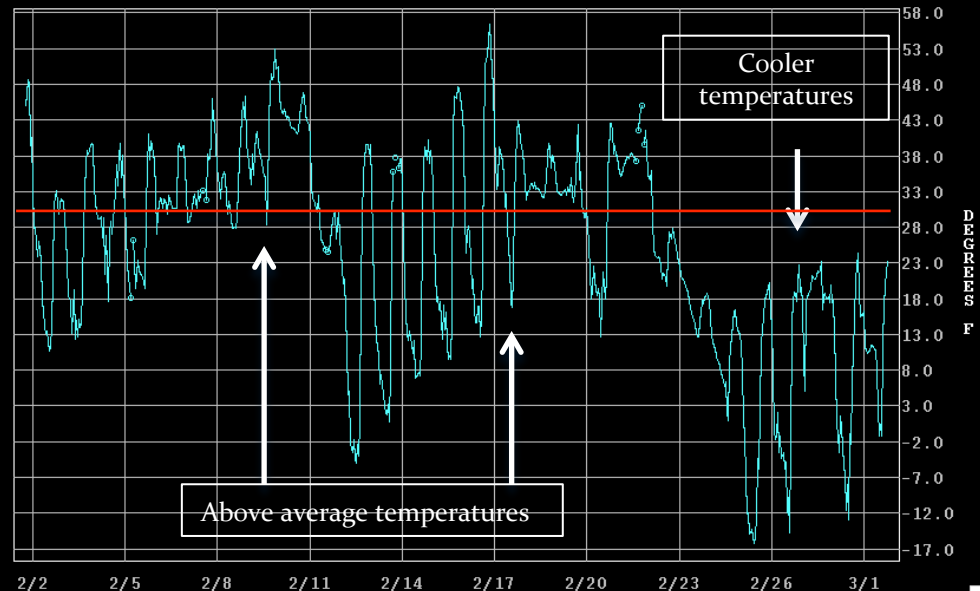


Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

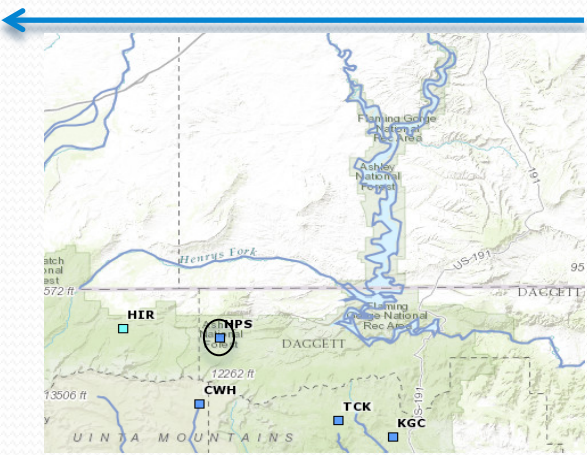


February Weather – Instantaneous Temperature Plots

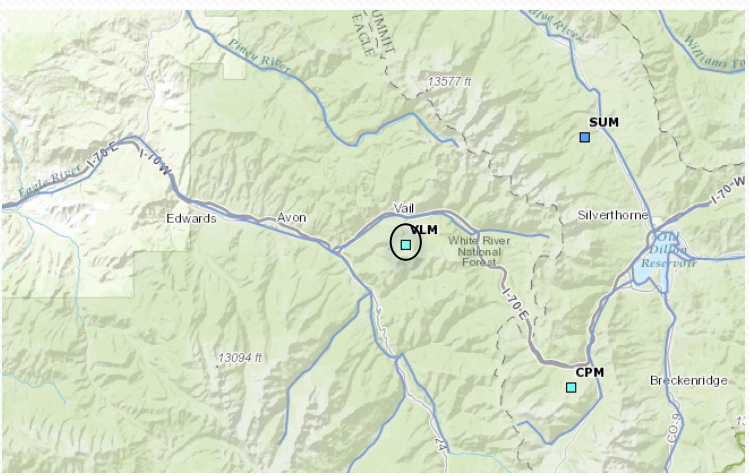
HICKERSON PARK
 HPSU1 TAIRMZZ AIR TEMPERATURE, INSTANTANEOUS, OBSERVED, METEOR
 Max= 56.5 at 02/16/2017 20Z
 Min= -16.2 at 02/25/2017 10Z



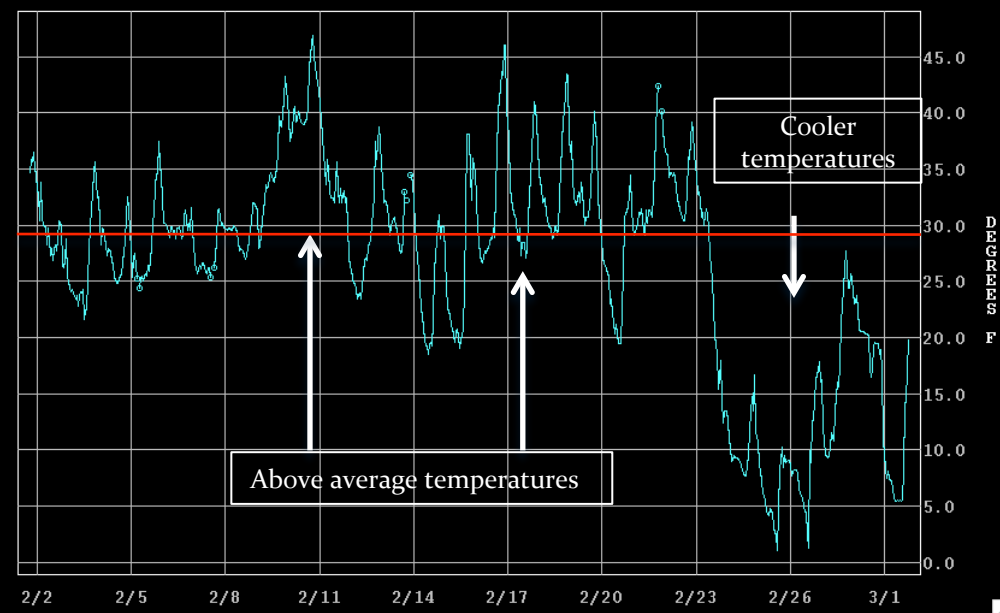
Hickerson Park SNOTEL
 Elevation: 9,145 Feet
 Upper Green River Basin



Vail Mountain SNOTEL
 Elevation: 10,300 Feet
 Colorado River Headwaters



VAIL MOUNTAIN
 VLMC2 TAIRMZZ AIR TEMPERATURE, INSTANTANEOUS, OBSERVED, METEOR
 Max= 46.9 at 02/10/2017 19Z
 Min= 1.0 at 02/25/2017 14Z

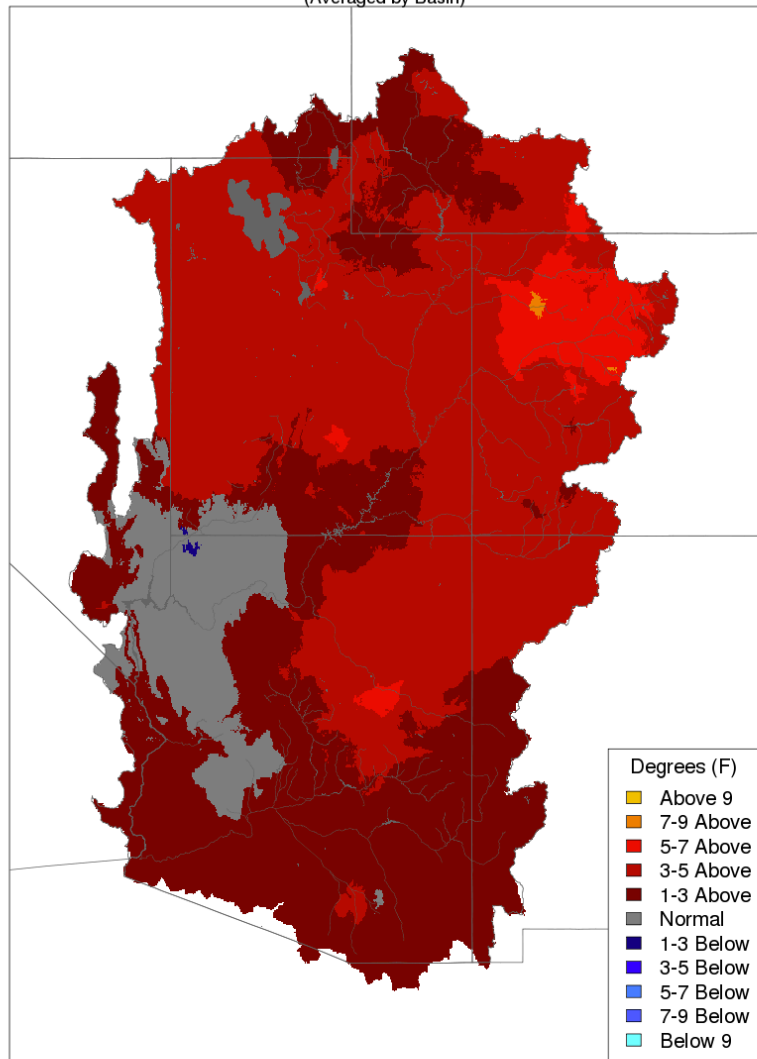


February Weather

Temperatures

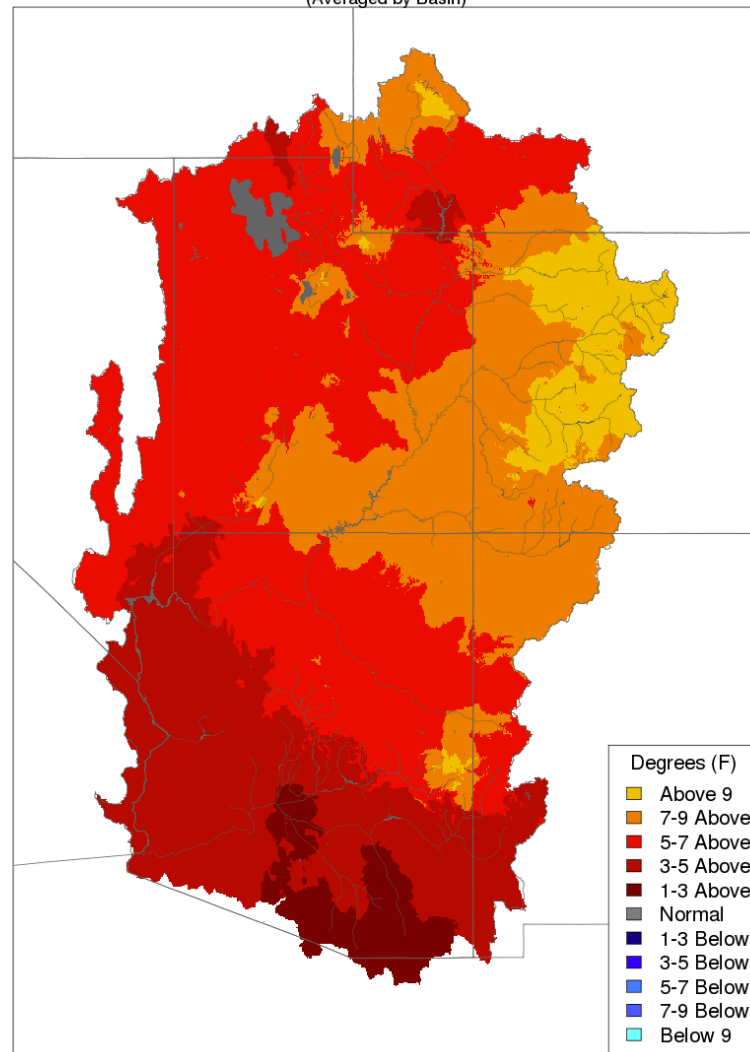
Some mean daily temperatures reached 15-25 degrees above average

Max Temp - Monthly Deviation - February 2017
(Averaged by Basin)



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

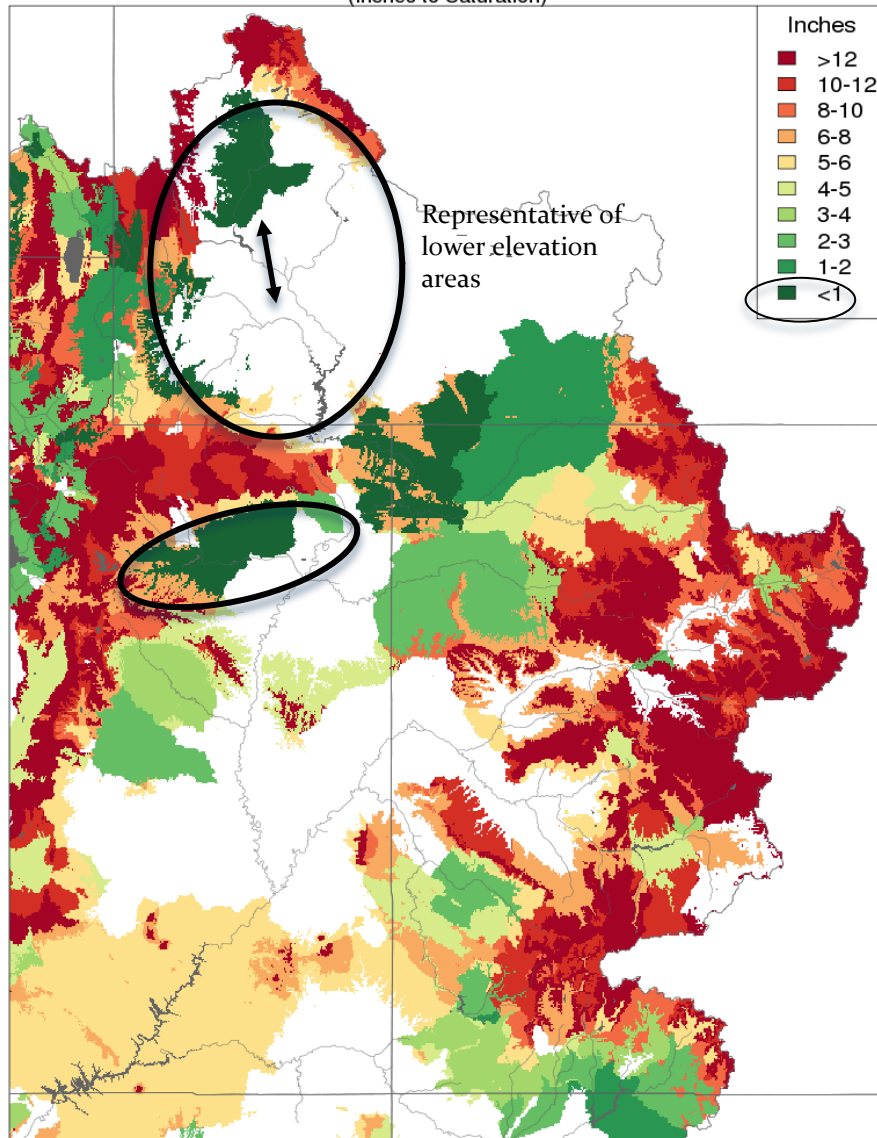
Min Temp - Monthly Deviation - February 2017
(Averaged by Basin)



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

Current Model Soil Saturation Condition

Soil Moisture - March 06 2017
(Inches to Saturation)



Model representation of where areas are becoming saturated (dark green < 1 inch)

Primary Use: Where very efficient runoff is likely (due to additional snowmelt or rainfall)

Areas with large deficits: Typically high elevation areas under snowpack. Significant melt has not begun and red/orange categories are normal for this time of year

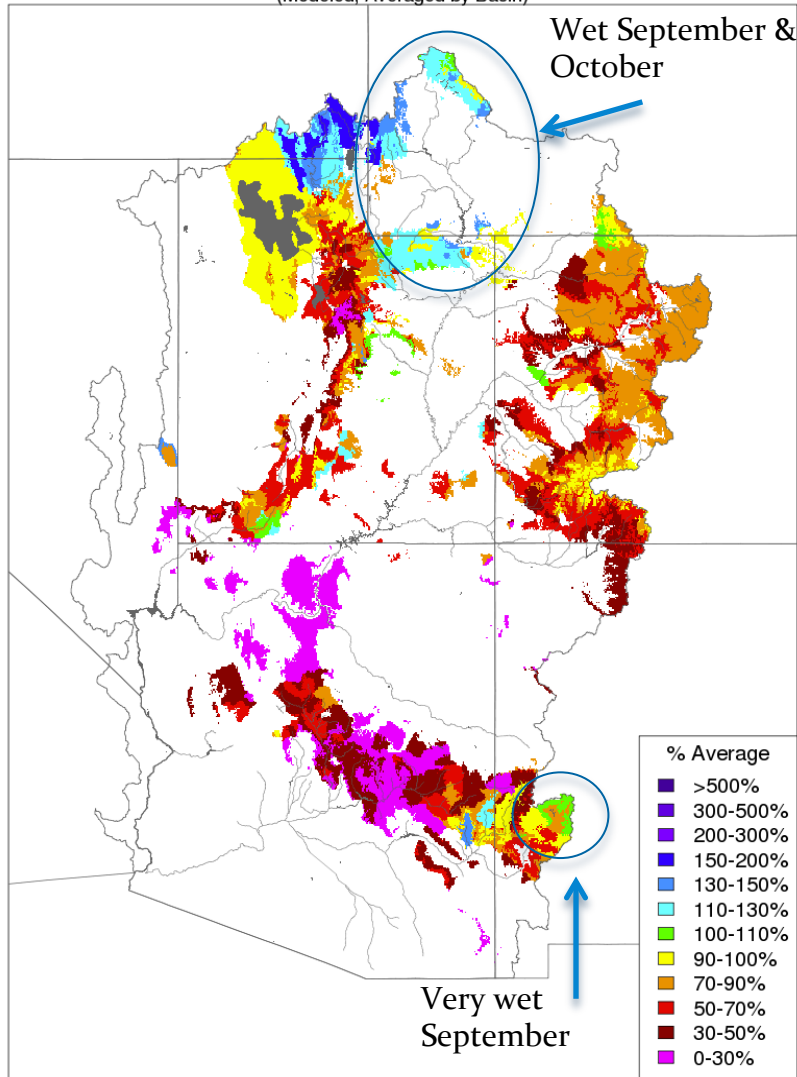
Not a representation of above / below average soil moisture conditions

Soil Moisture Impacts

Model Soil Moisture entering winter

Soil Moisture - Fall - 2016 (November 16)

(Modeled, Averaged by Basin)



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

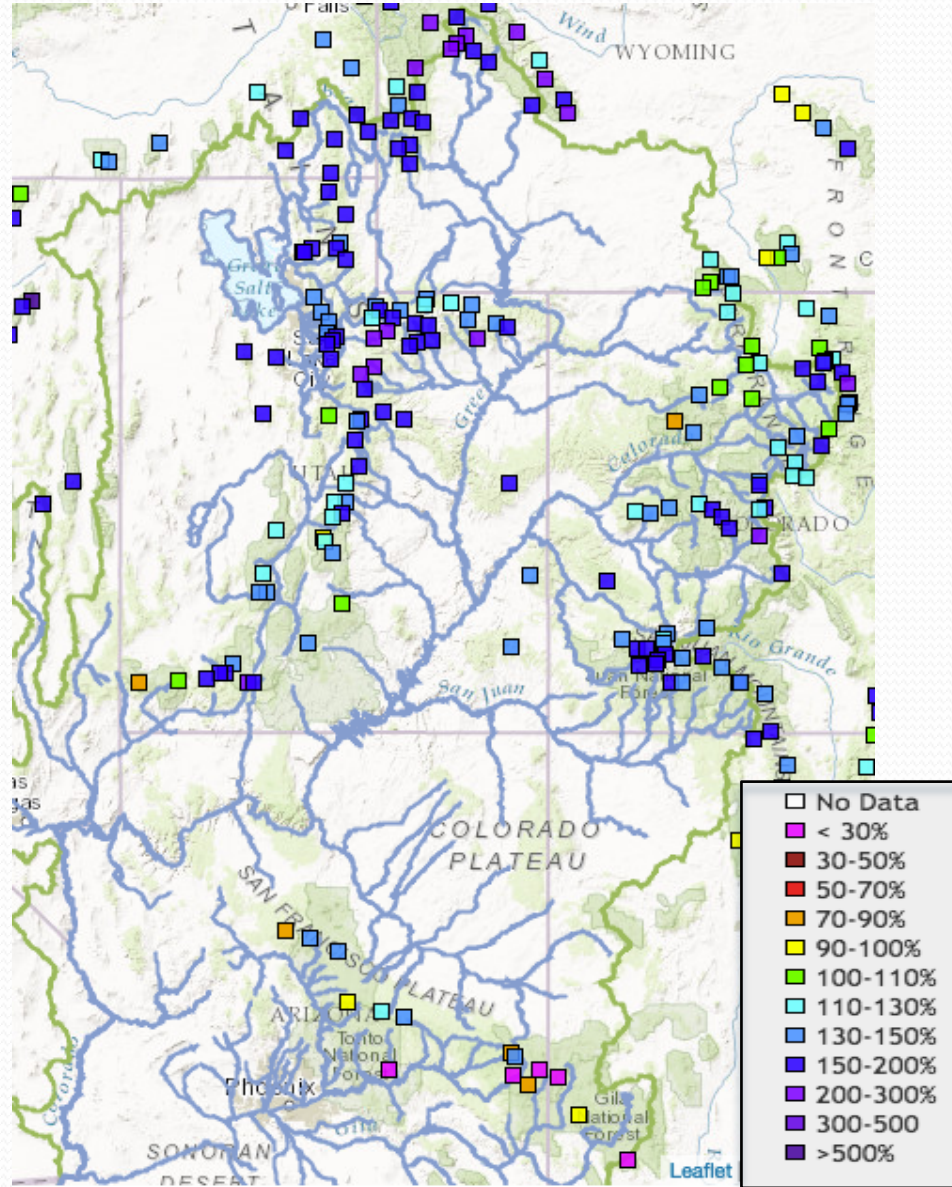
2017 Water Supply Impacts :

- A driver of early season forecasts; higher/ lower by 3-10% of average.
- In significant snowpack areas below average soil moisture less likely to have a large impact.
- Significant snowpack + wet soils could see more enhanced spring runoff
 - Upper Green and Duchesne river basins

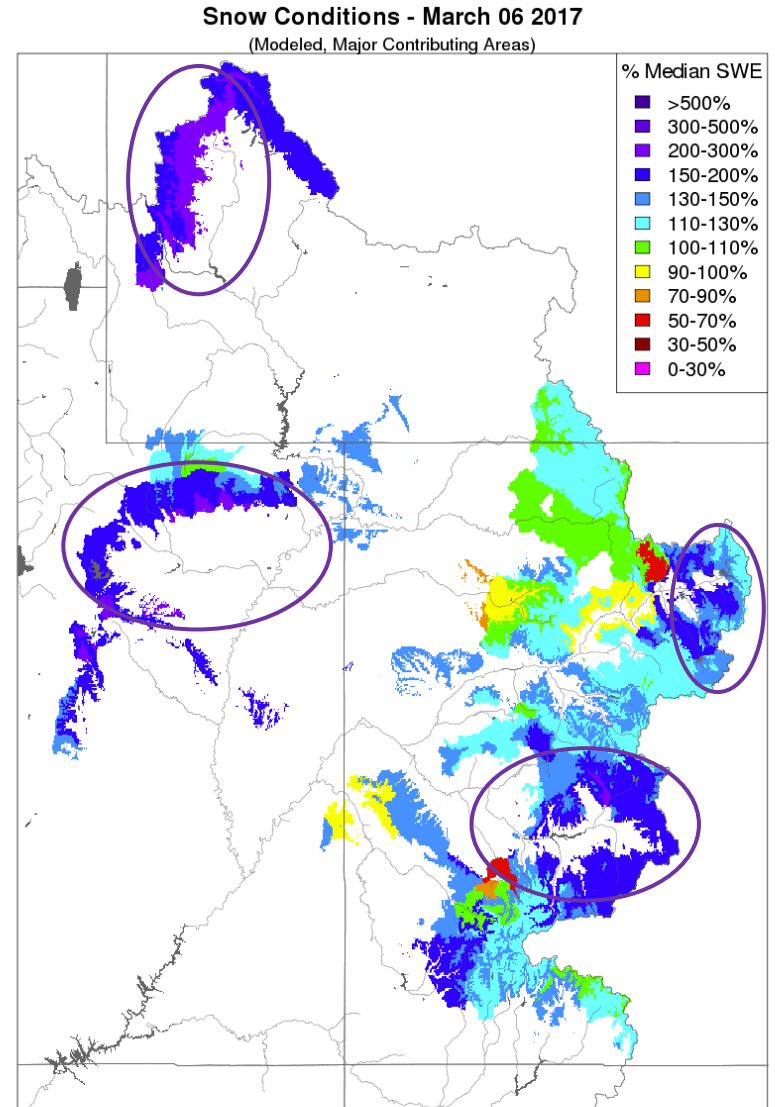
This is representation of above / below average soil moisture conditions prior to snowmelt (valid at higher elevations of northern basins)

Snow Conditions

SNOTEL (% median): March 6, 2017



CBRFC MODEL SNOW (% median):

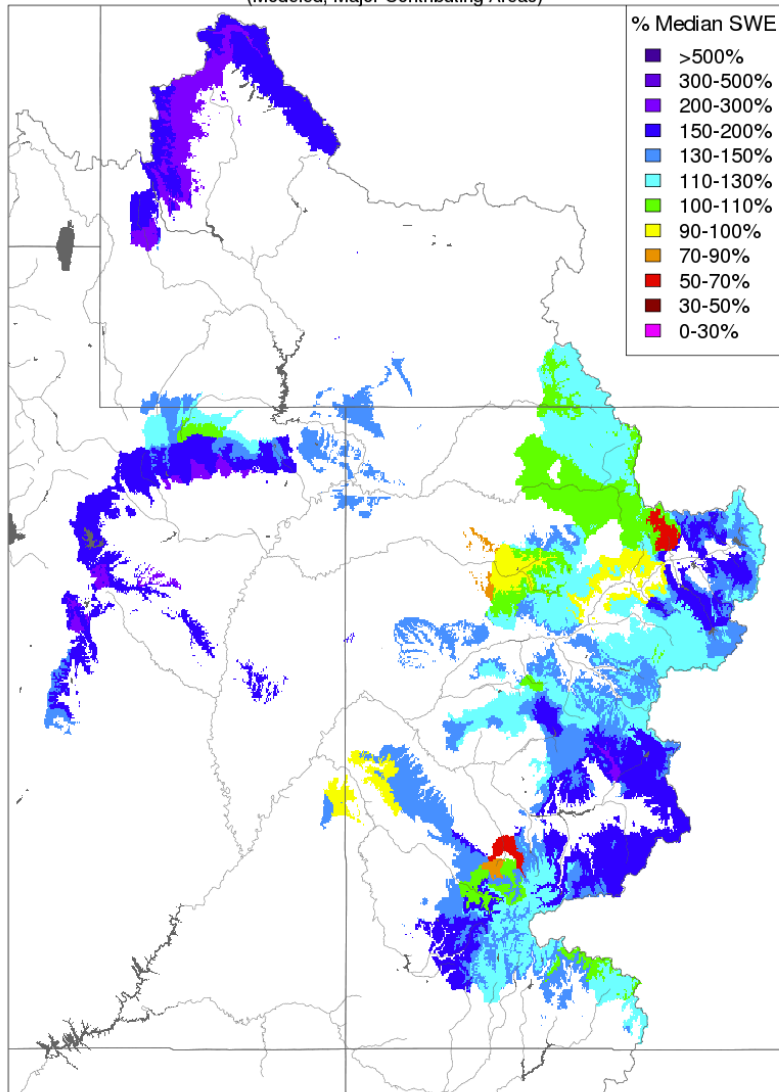


Snow Conditions

Areas that are typically non contributors may play a part this year

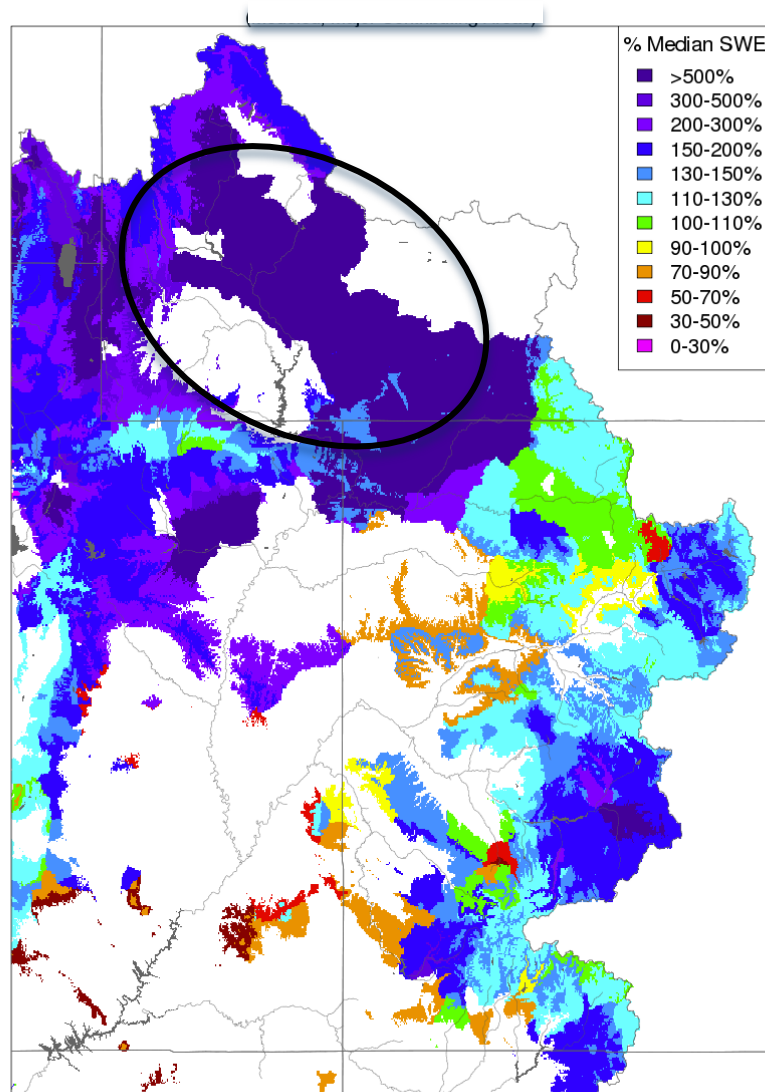
Snow Conditions - March 06 2017

(Modeled, Major Contributing Areas)



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

Snow Conditions - March 06 2017



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

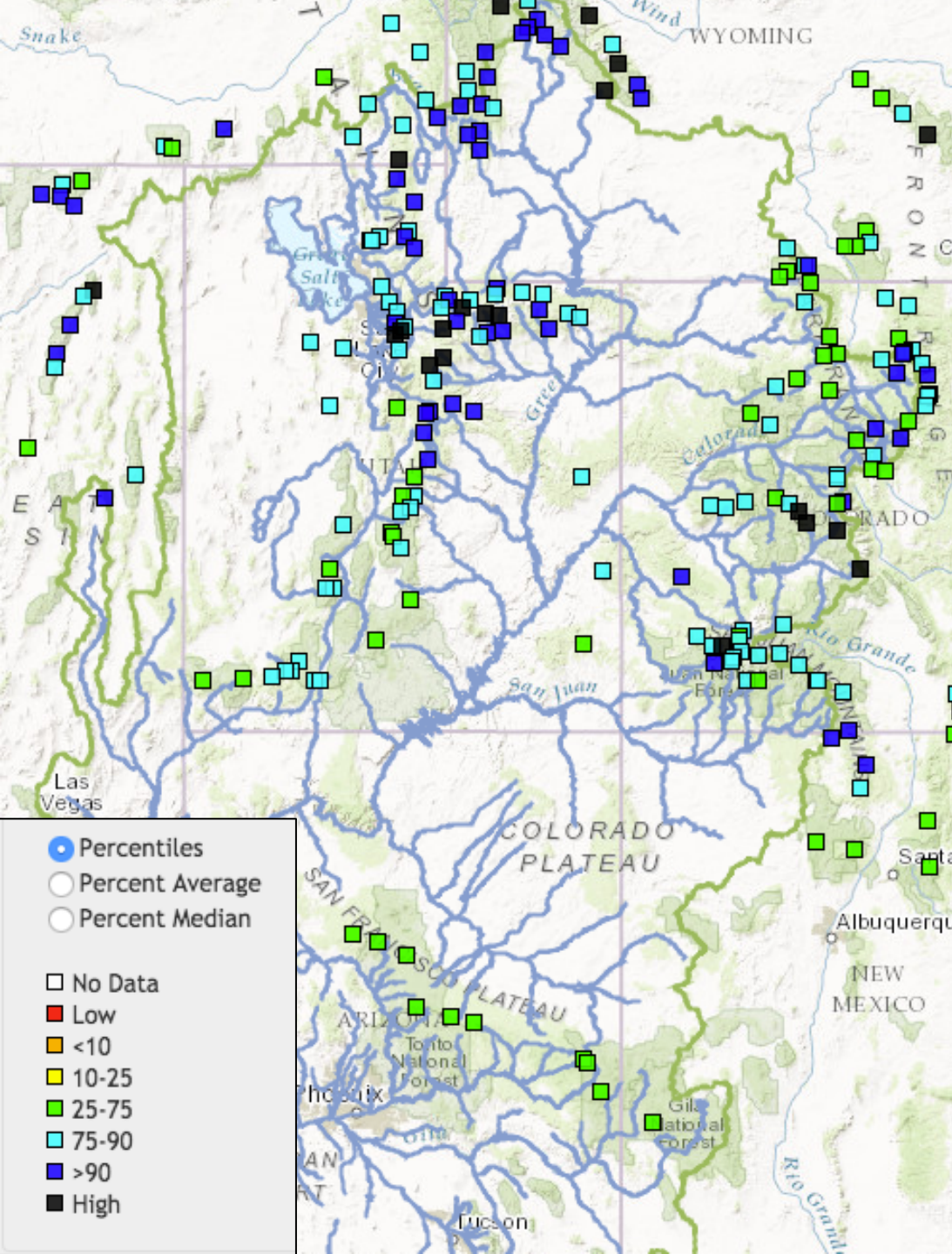
Snow Conditions

SNOTEL ranking for March 6th 2017

Black - Highest on record

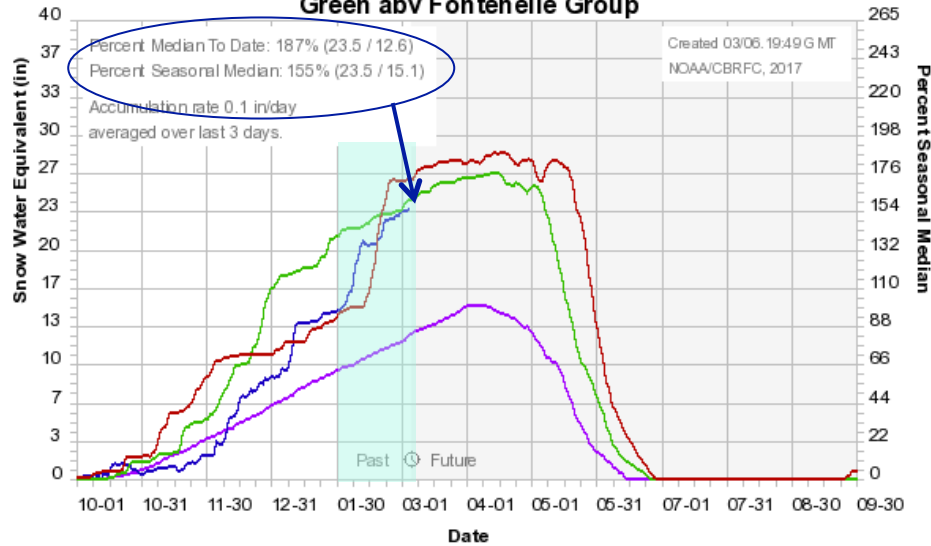
Dark Blue - Top 10% of record (most 2nd or 3rd)

Period of record 34-39 years most sites

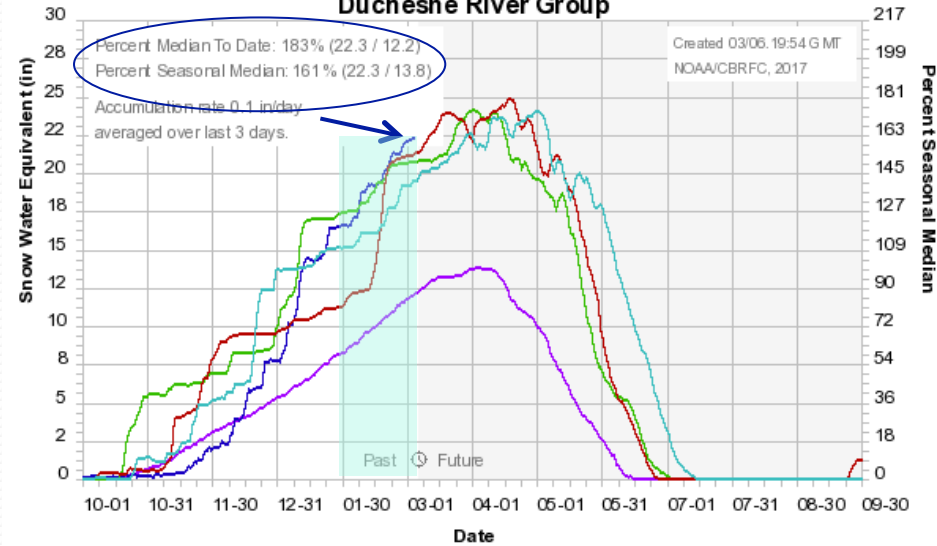


February Weather: Impact to the snowpack

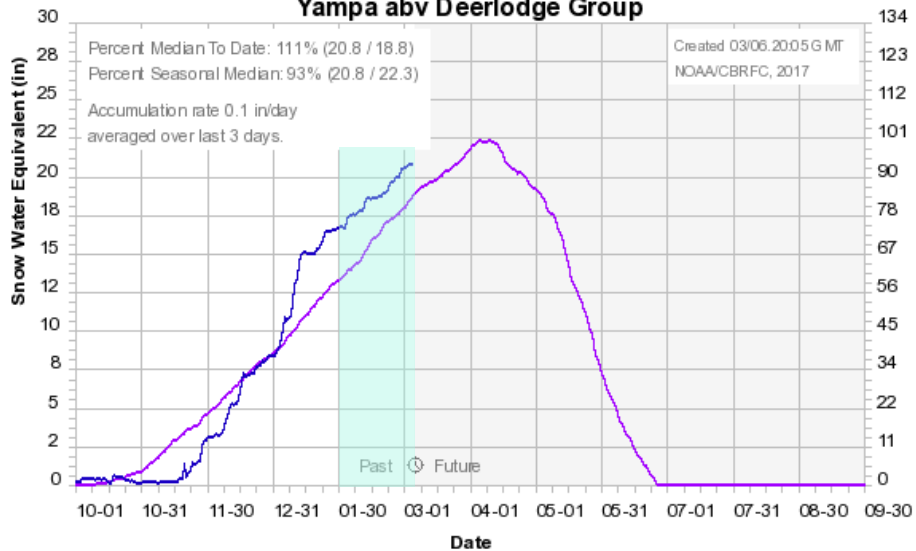
Colorado Basin River Forecast Center
Green abv Fontenelle Group



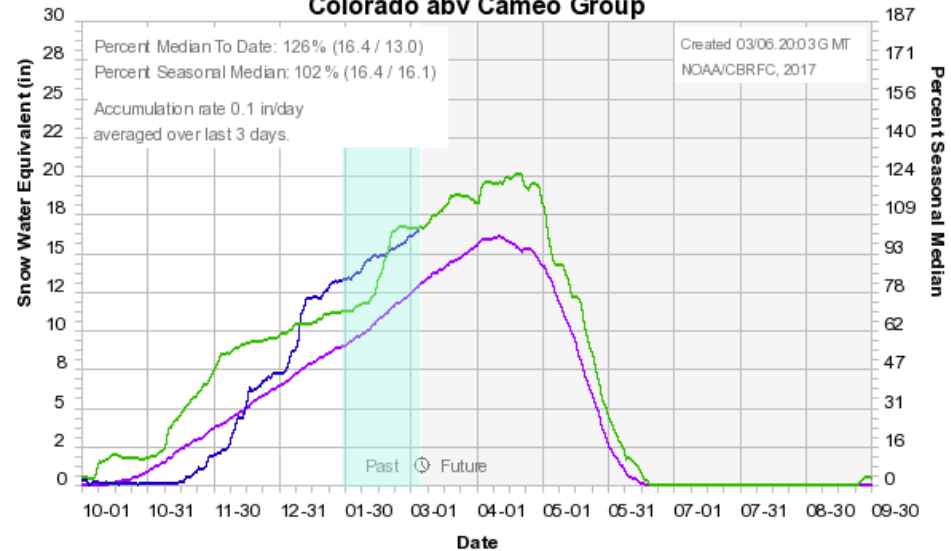
Colorado Basin River Forecast Center
Duchesne River Group



Colorado Basin River Forecast Center
Yampa abv Deerlodge Group

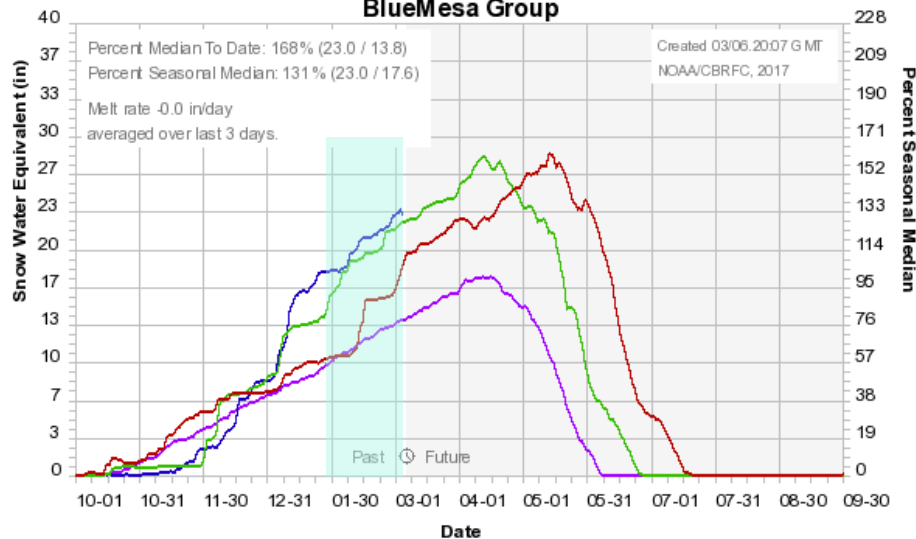


Colorado Basin River Forecast Center
Colorado abv Cameo Group

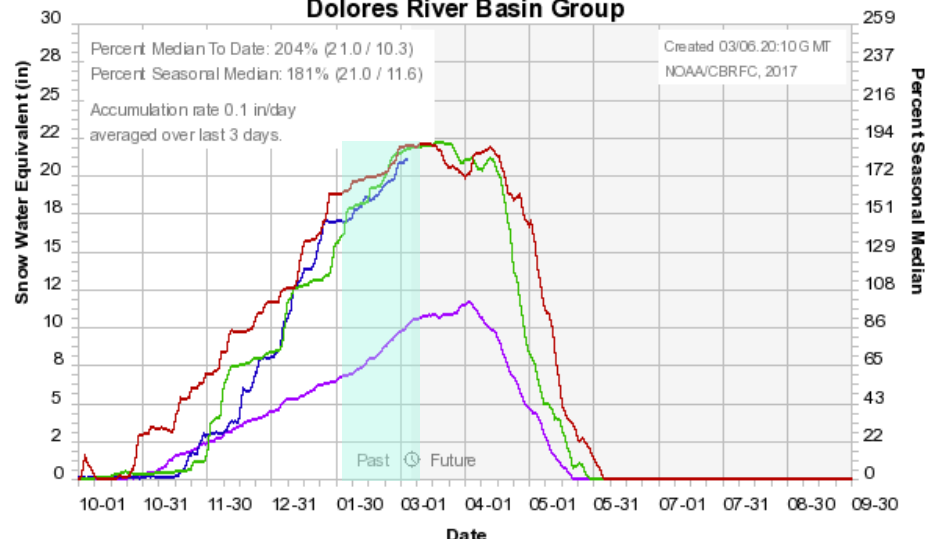


February Weather: Impact to the snowpack

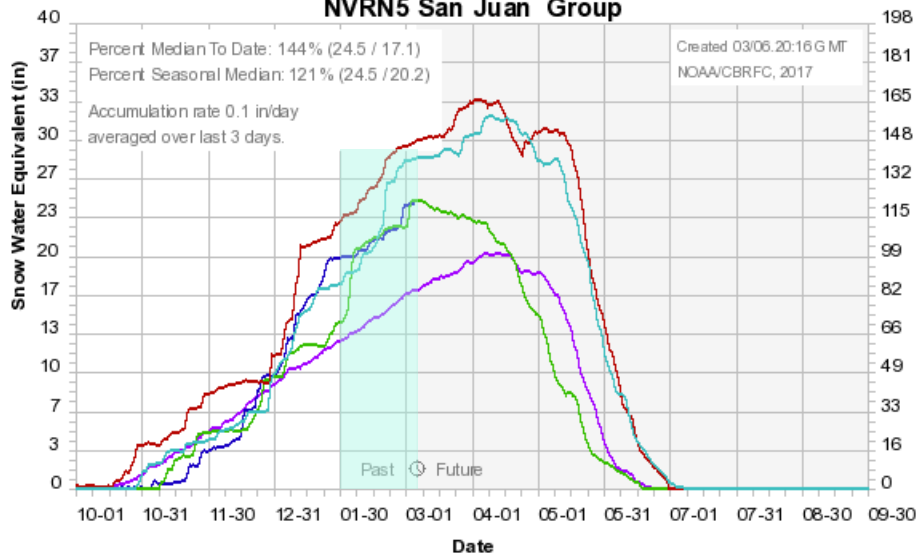
Colorado Basin River Forecast Center
BlueMesa Group



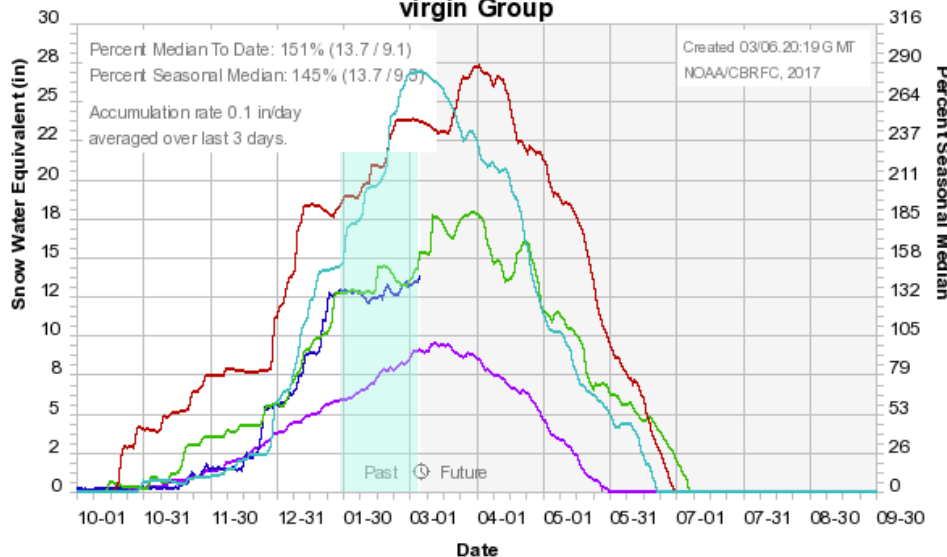
Colorado Basin River Forecast Center
Dolores River Basin Group



Colorado Basin River Forecast Center
NVRN5 San Juan Group



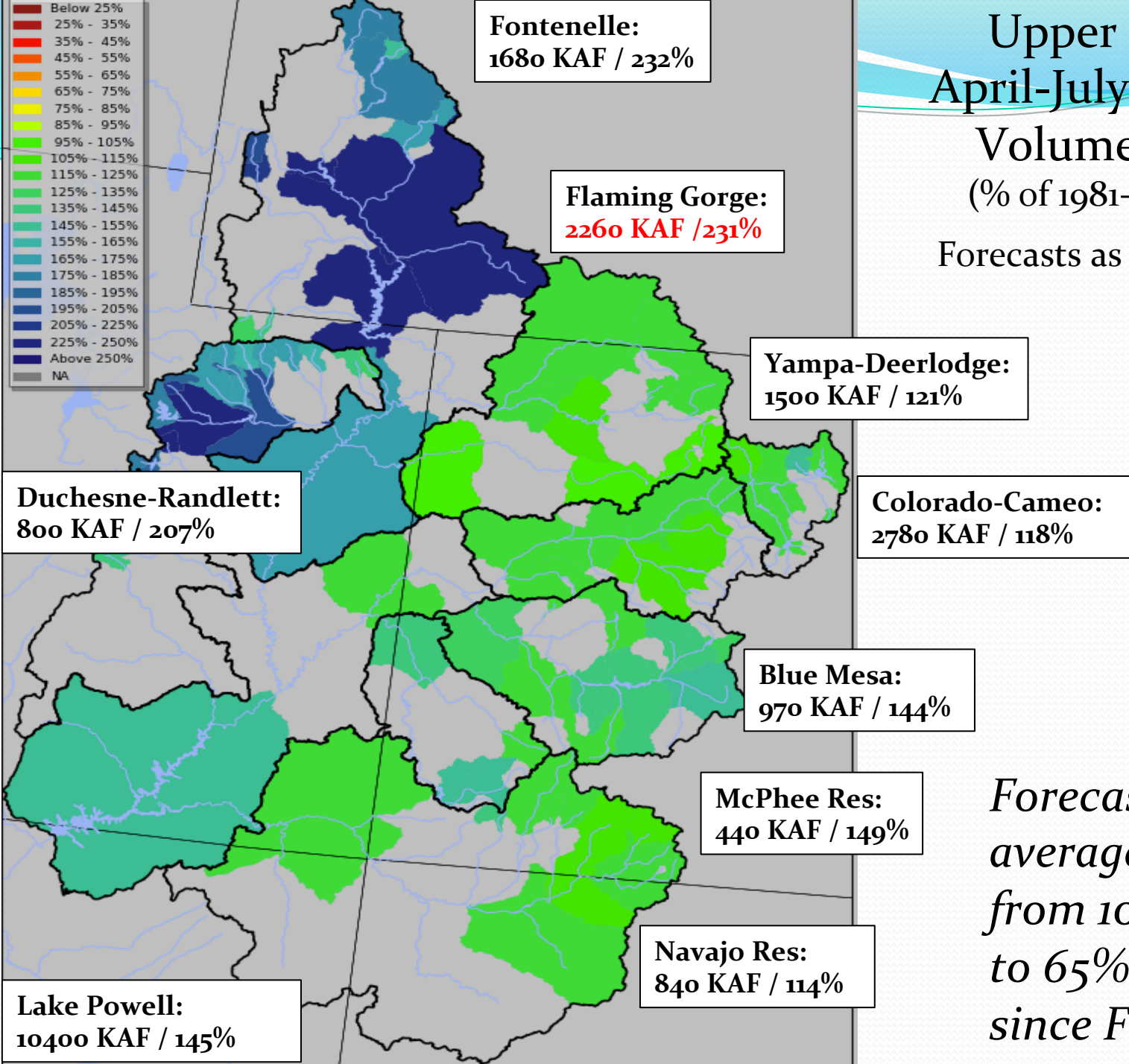
Colorado Basin River Forecast Center
virgin Group



Upper Colorado April-July Streamflow

Volume Forecasts (% of 1981-2010 average)

Forecasts as of Mar 1 2017



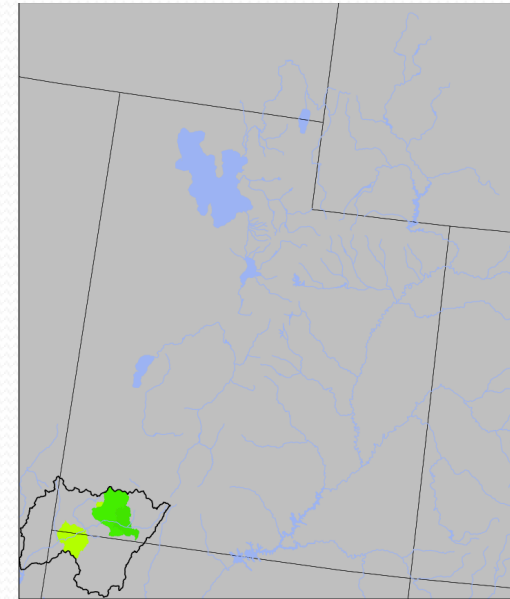
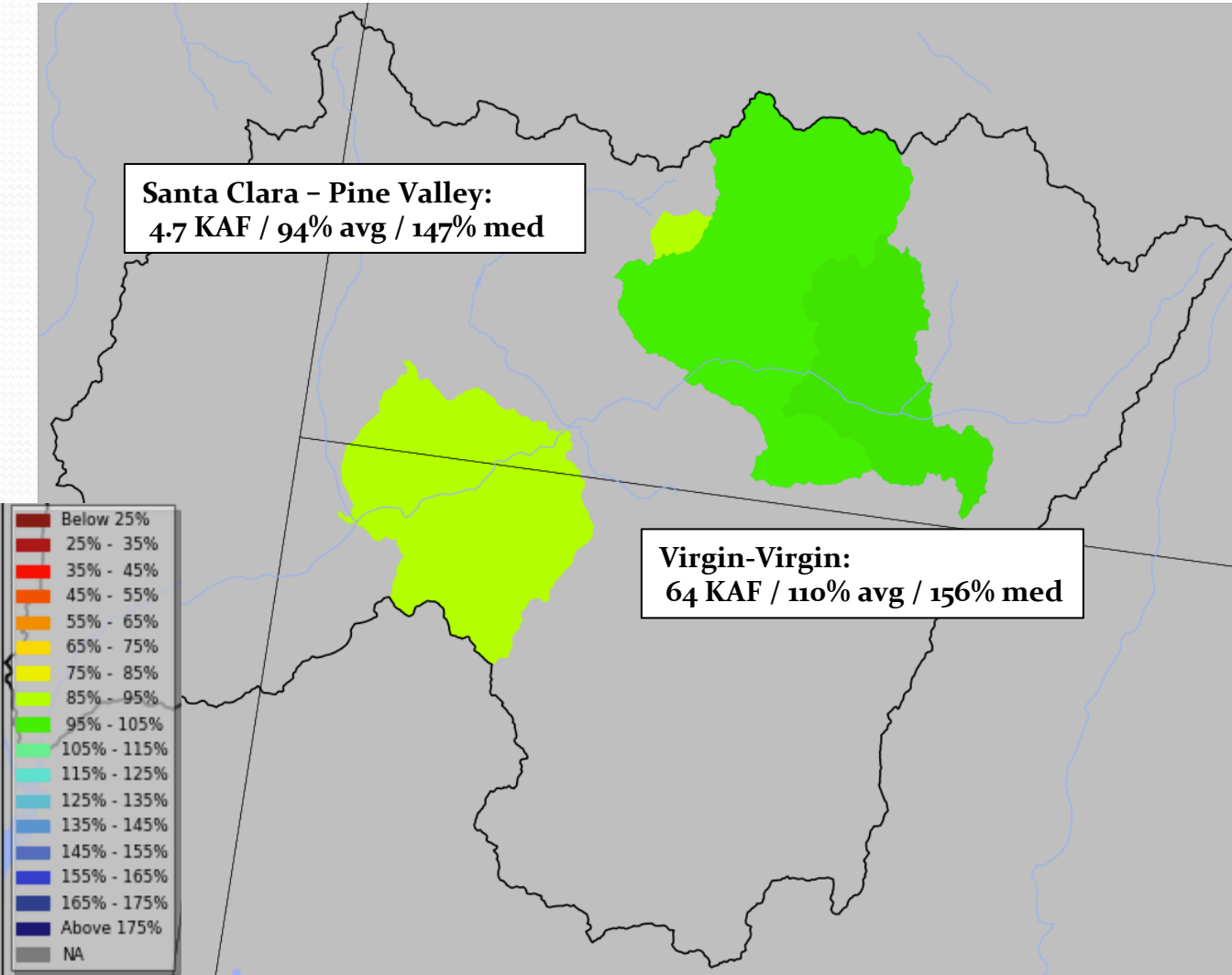
Forecasted percent averages changes from 10% decrease to 65% increase since Feb 1

Lower Colorado (Virgin River)

April-July Streamflow Volume Forecasts

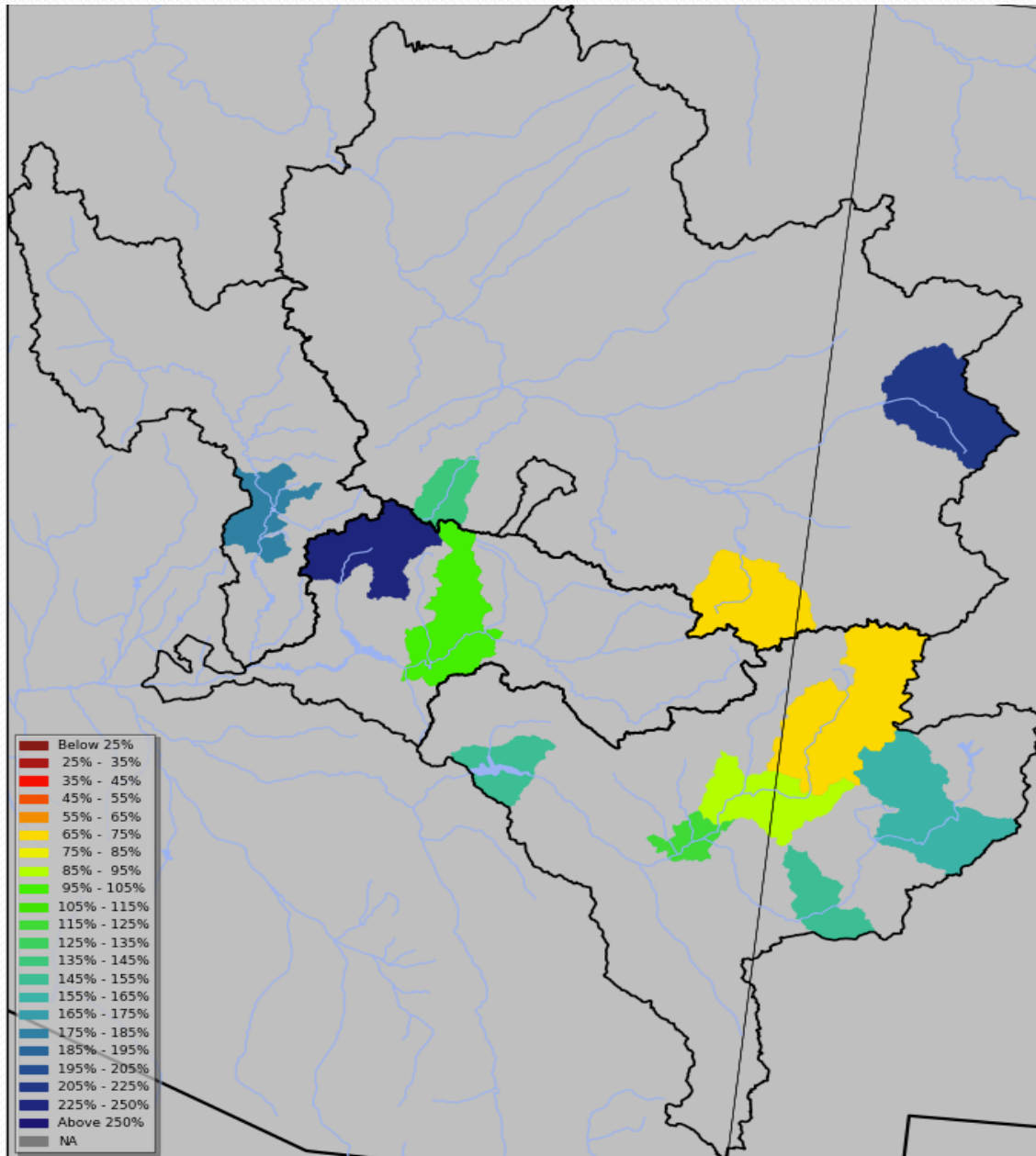
(% of 1981-2010 average / median)

Forecasts as of Mar 1 2017

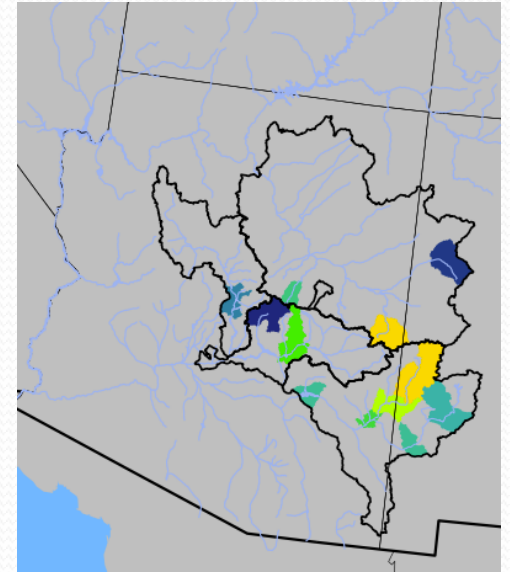


Lower Colorado Mar-May Streamflow Volume Forecasts

(% of 1981-2010 median)



Forecasts as of Mar 1 2017



Little Colorado-Lyman:
4.1 KAF / 68% med

Verde-Horseshoe:
194 KAF / 181% med

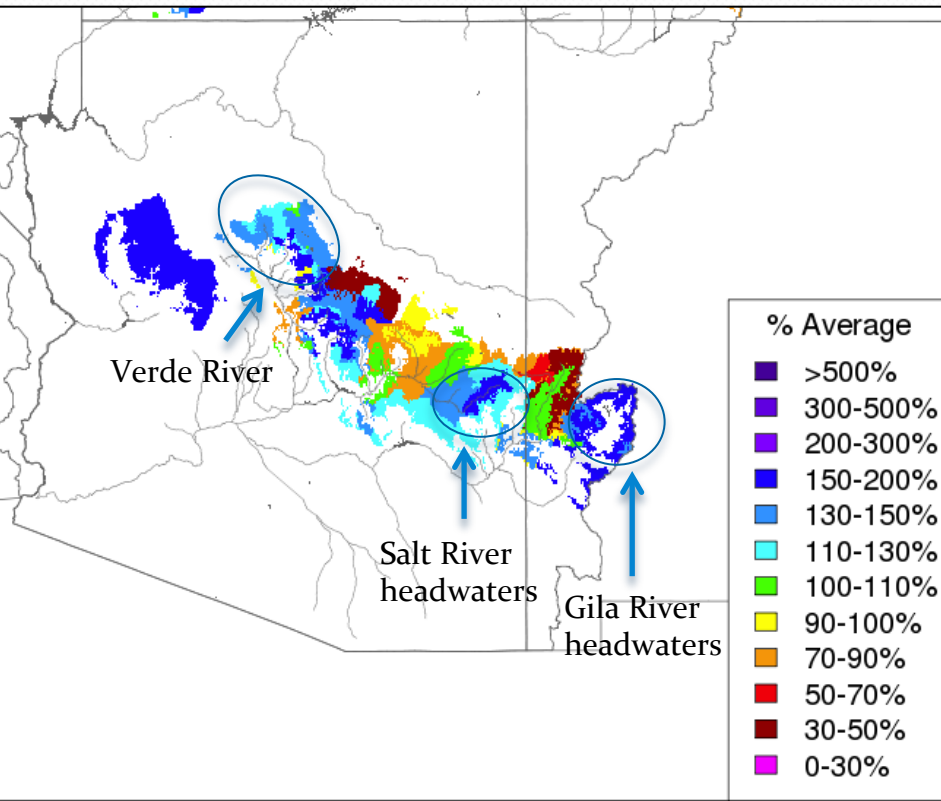
Salt - Roosevelt:
230 KAF / 95% med

Gila-Gila:
55 KAF / 162% med

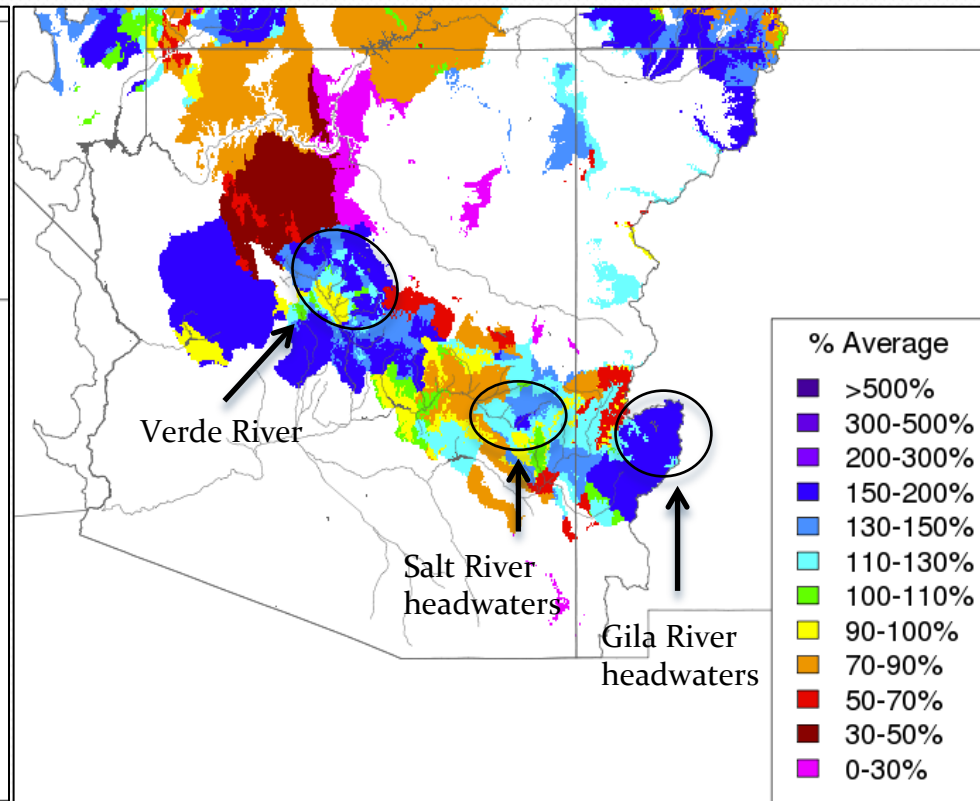
CBRFC Model Soil Moisture

Winter rain and snowmelt impacts to soil moisture in the Lower Colorado River Basin

Feb 6 2017

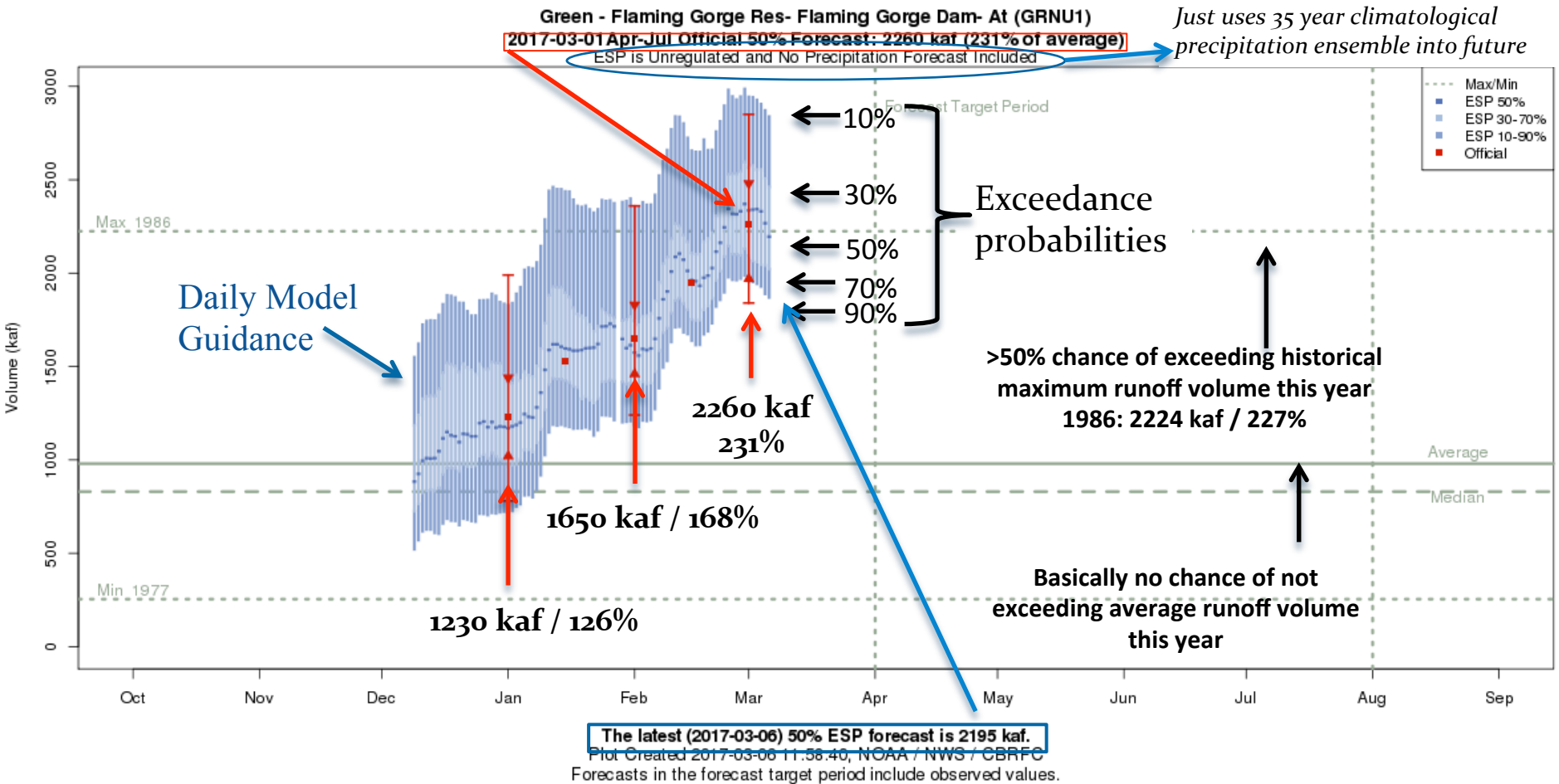


Mar 6 2017



Forecast Evolution Plot: Flaming Gorge Inflow

Daily Ensemble Streamflow Prediction (ESP) Model Run & Official Forecasts

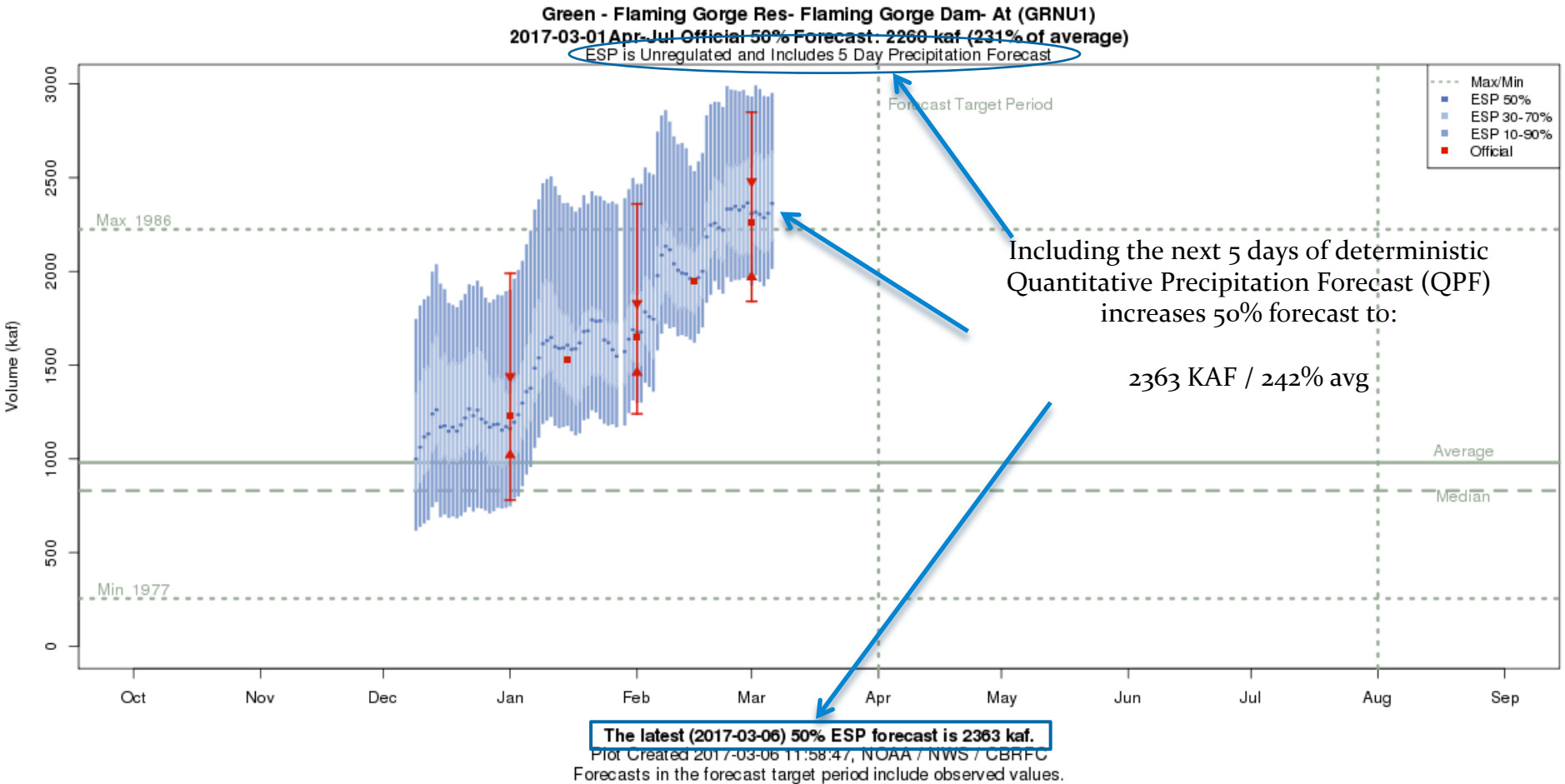


Plots are available at: <https://www.cbrfc.noaa.gov>

Select WATER SUPPLY from the top menu

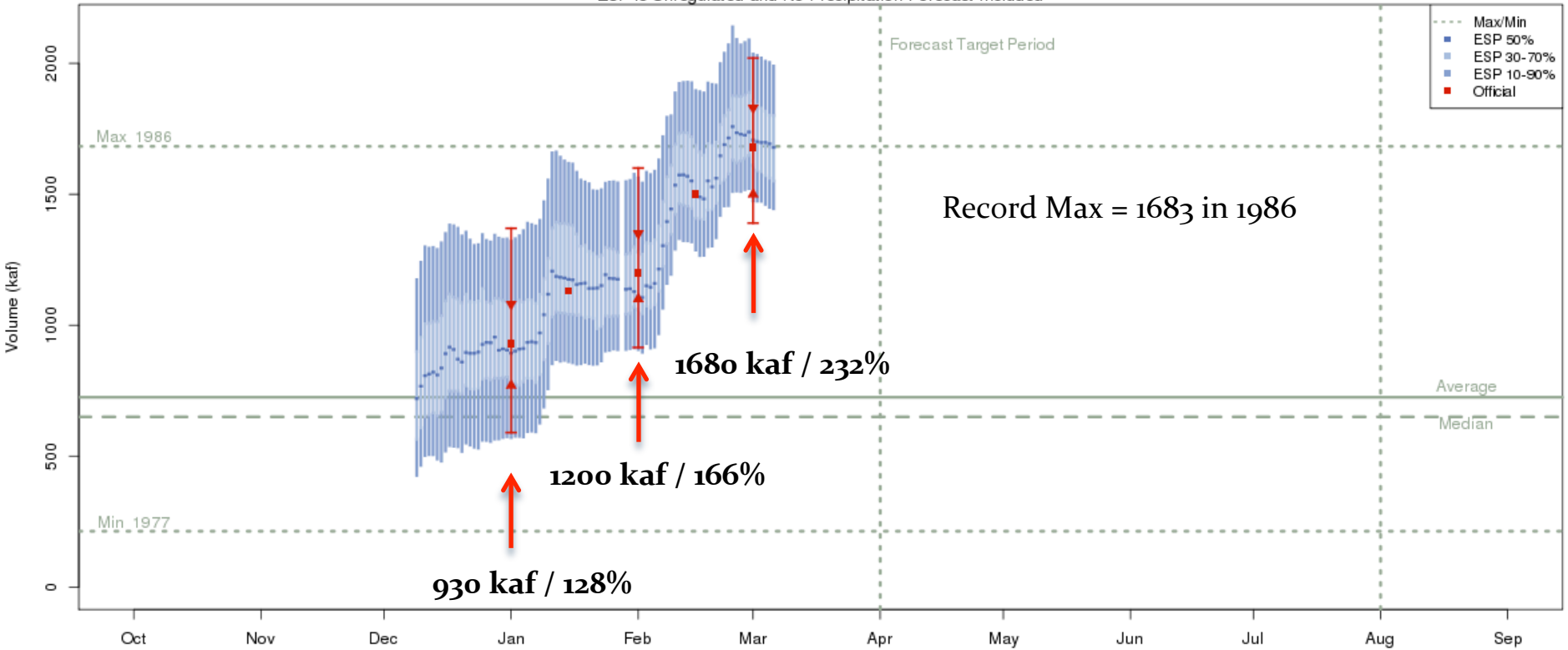
Click on desired location for pop-up, click again for full screen

Forecast Evolution Plot: Flaming Gorge Inflow



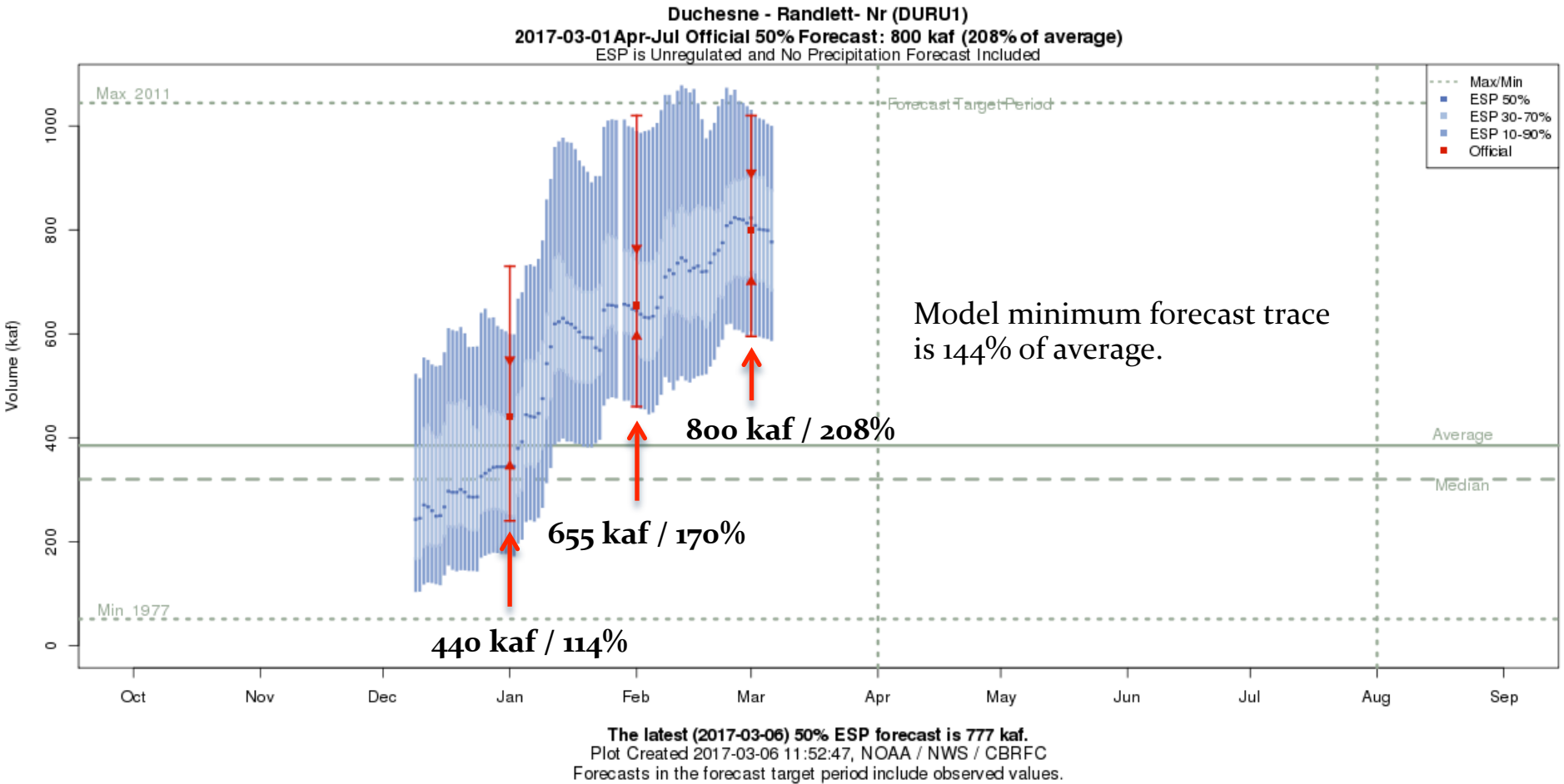
Forecast Evolution Plot: Fontenelle Inflow

Green - Fontenelle Res- Fontenelle Nr (GBRW4)
2017-03-01 Apr-Jul Official 50% Forecast: 1680 kaf (232% of average)
ESP is Unregulated and No Precipitation Forecast Included



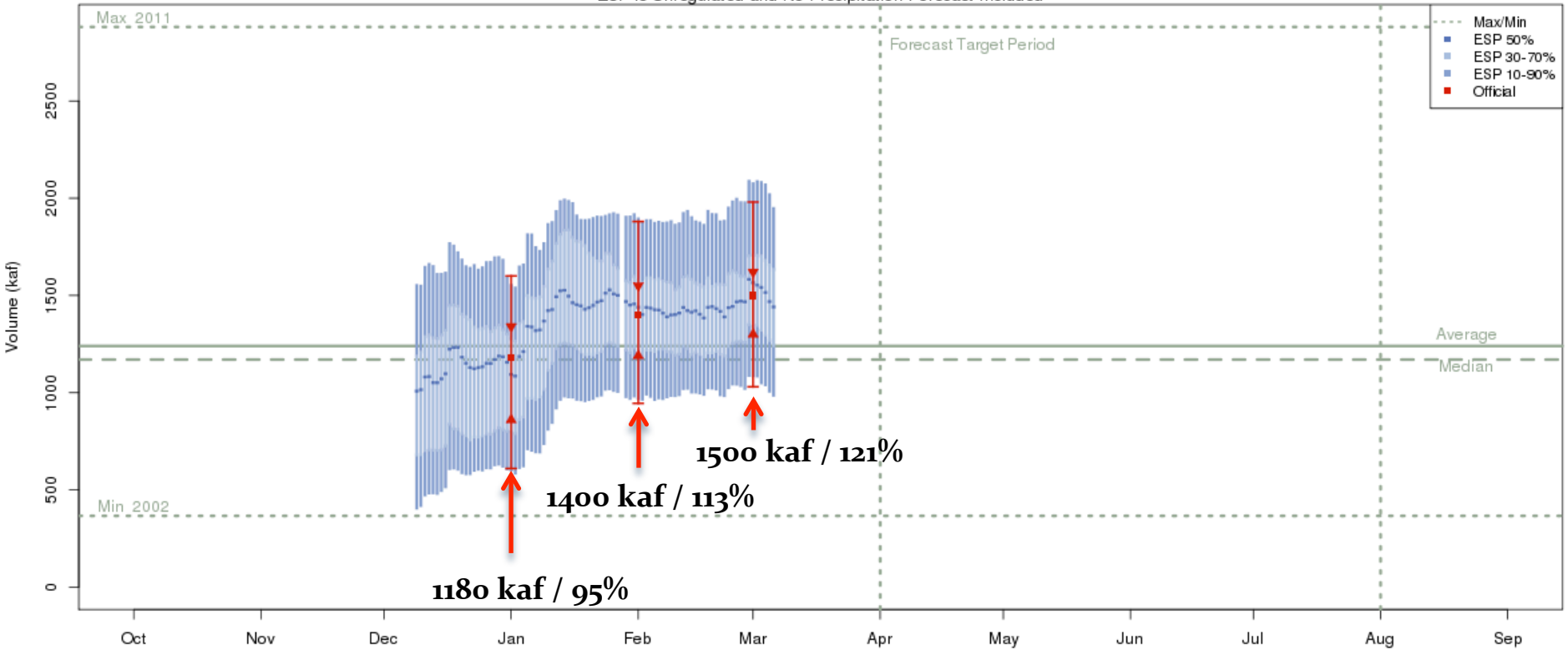
The latest (2017-03-06) 50% ESP forecast is 1679 kaf.
Plot Created 2017-03-06 11:56:23, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

Forecast Evolution Plot: Duchesne-Randlett



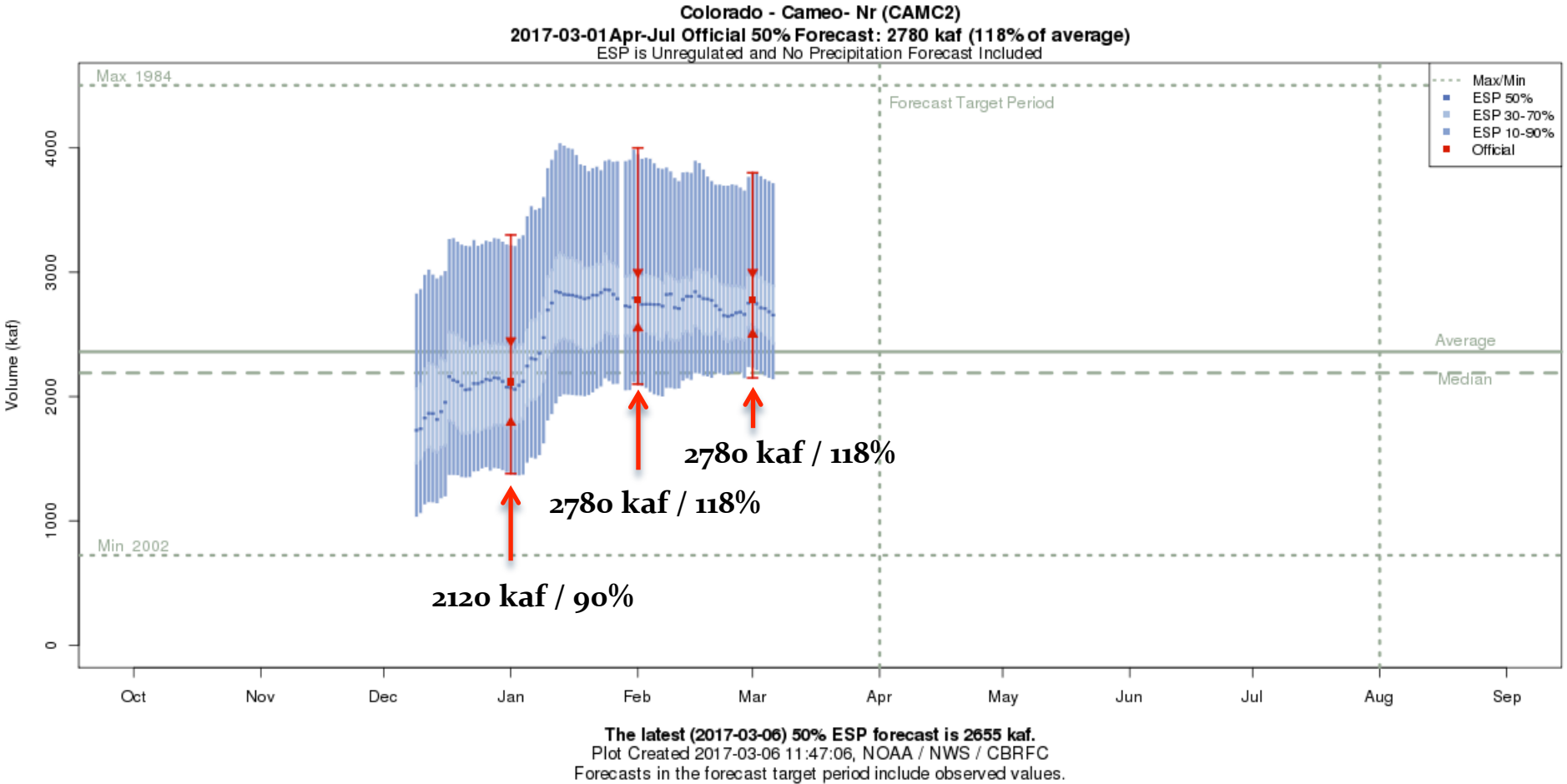
Forecast Evolution Plot: Yampa - Deerlodge Park

Yampa - Deerlodge Park (YDLC2)
2017-03-01 Apr-Jul Official 50% Forecast: 1500 kaf (121% of average)
ESP is Unregulated and No Precipitation Forecast Included

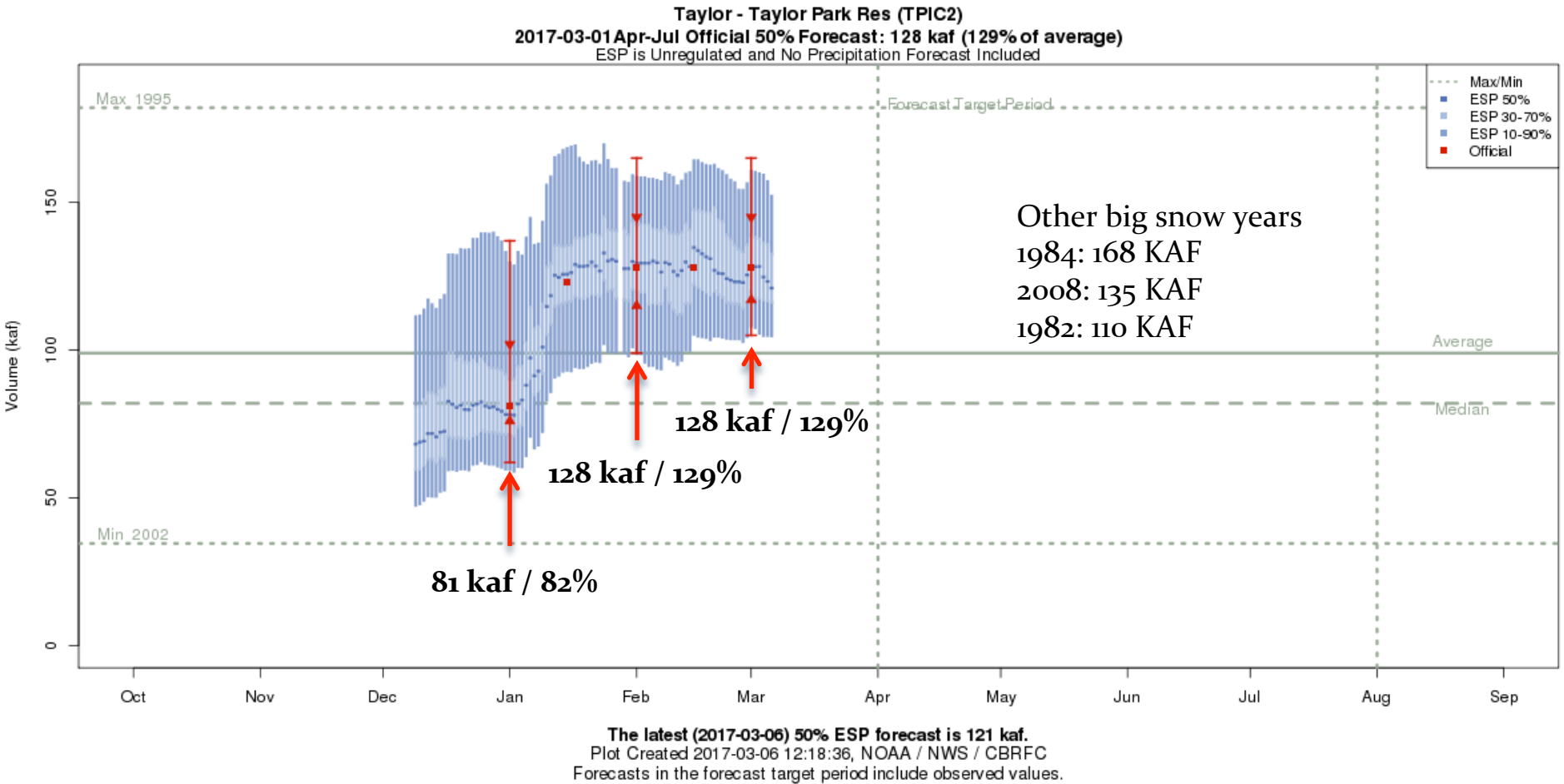


The latest (2017-03-06) 50% ESP forecast is 1441 kaf.
Plot Created 2017-03-06 12:23:58, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

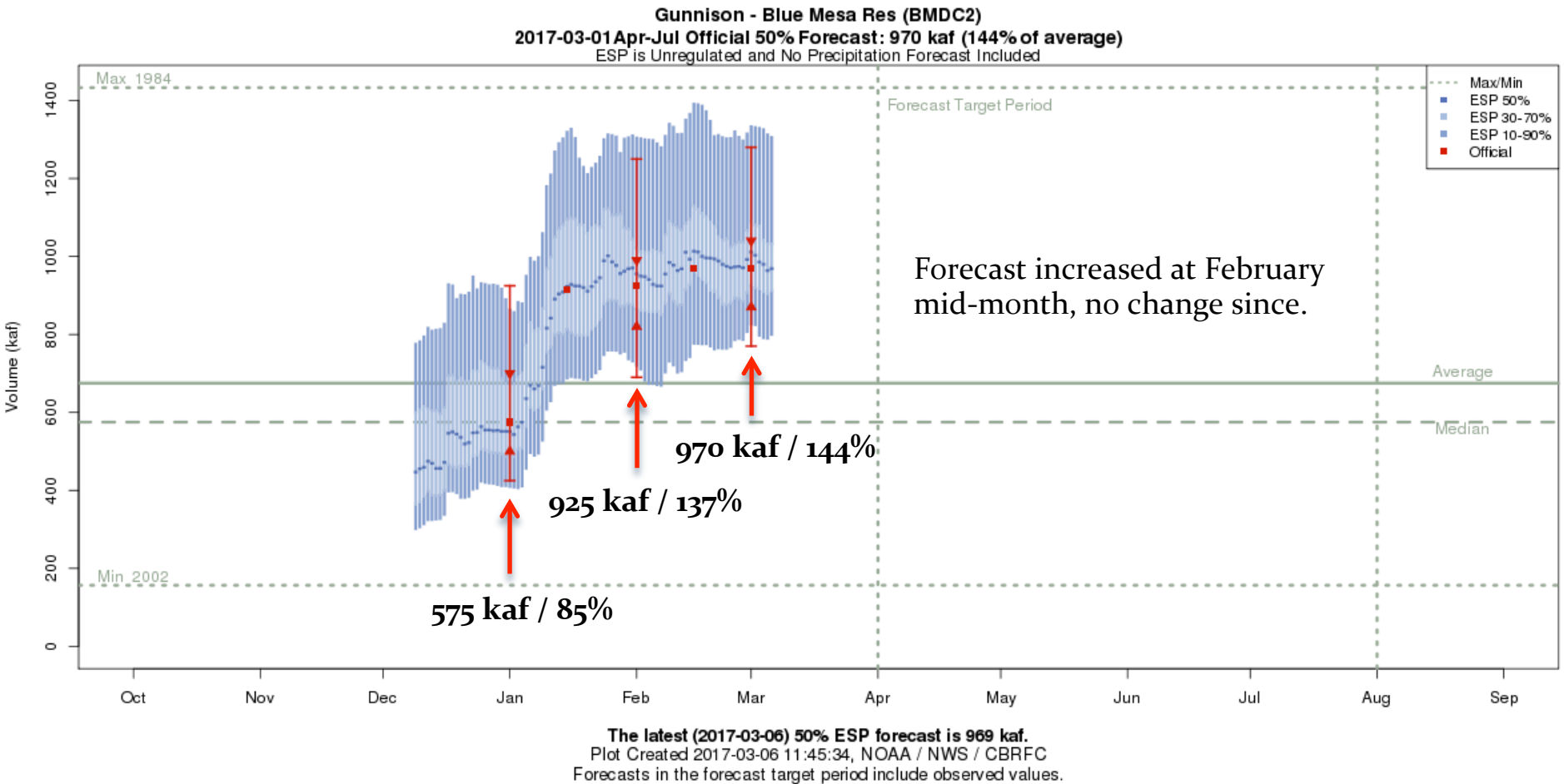
Forecast Evolution Plot: Colorado near Cameo



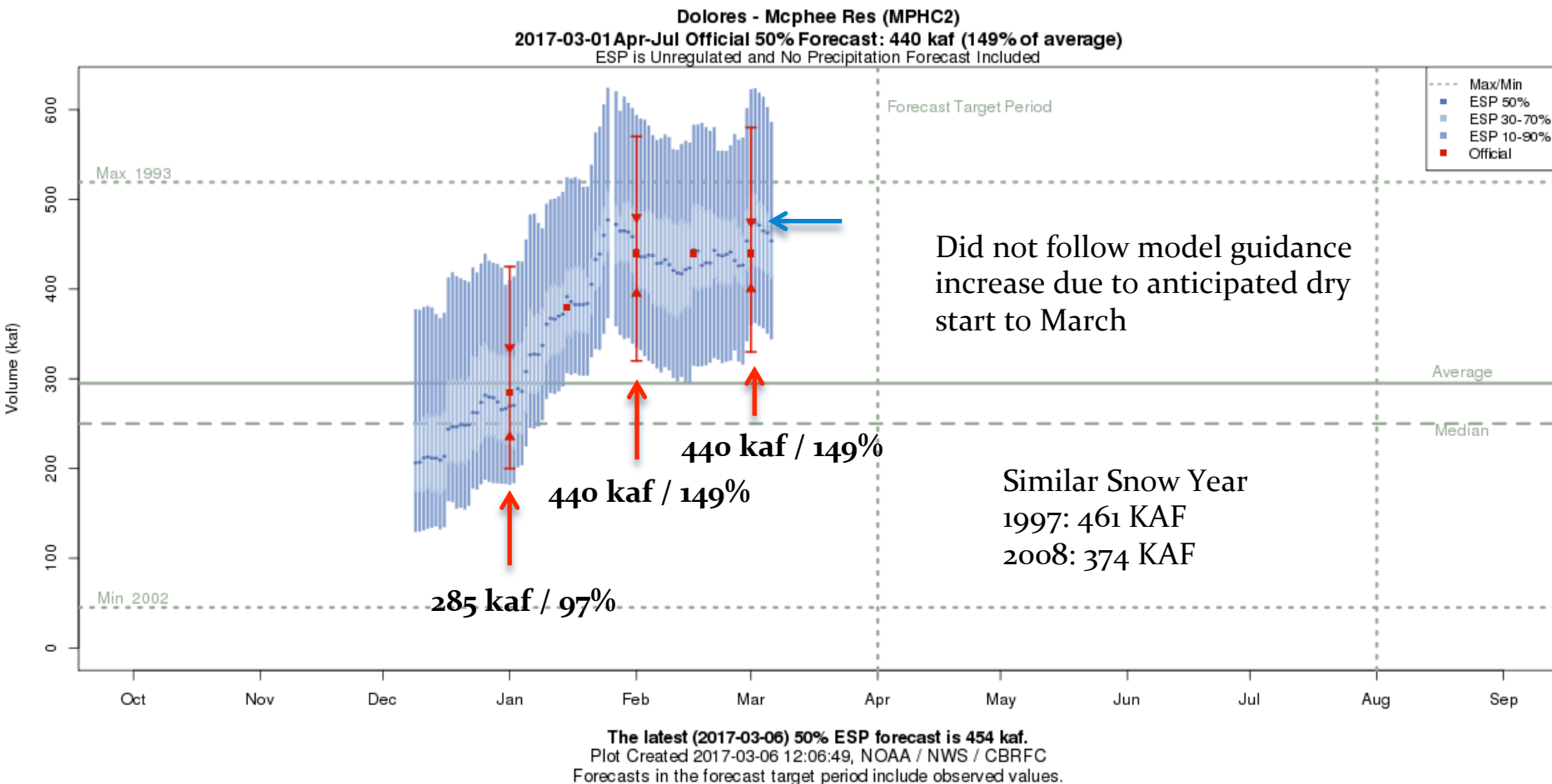
Forecast Evolution Plot: Taylor - Taylor Park Inflow



Forecast Evolution Plot: Gunnison - Blue Mesa Inflow

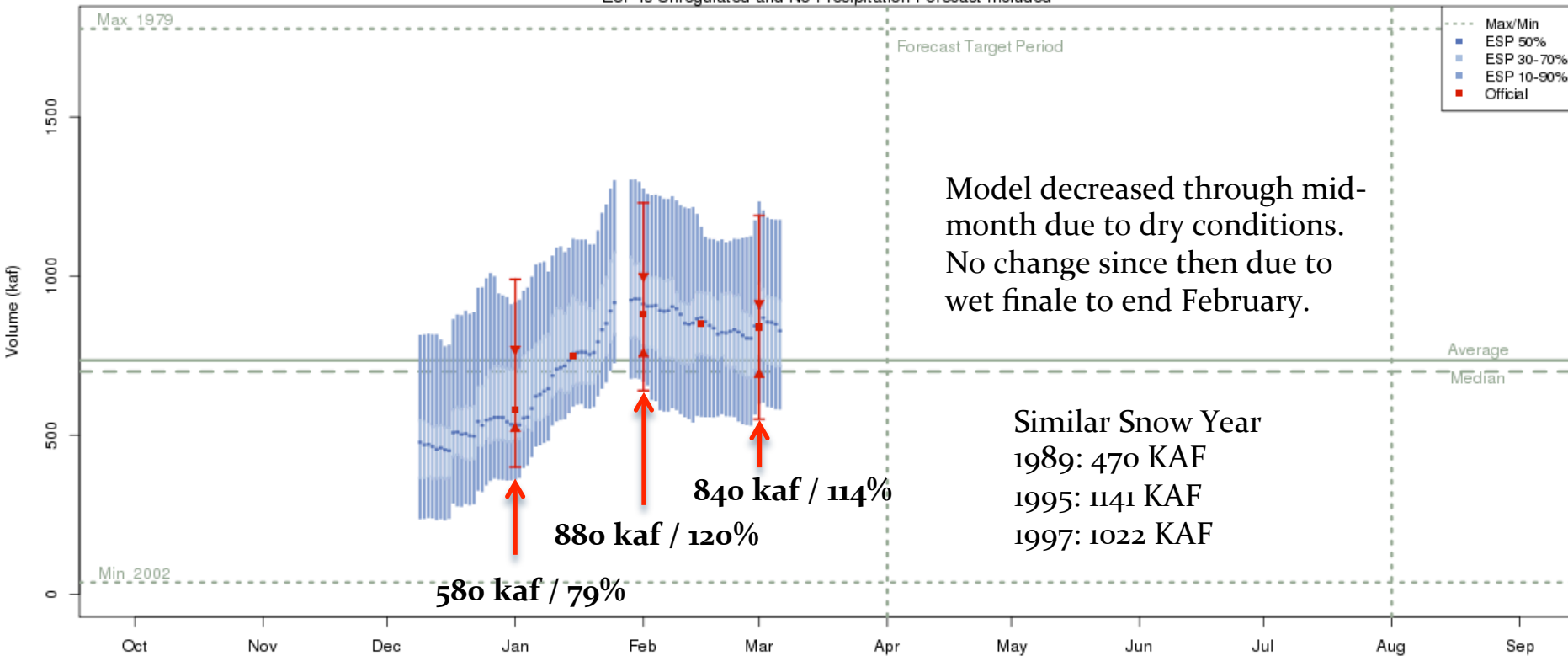


Forecast Evolution Plot: Dolores - McPhee Reservoir Inflow



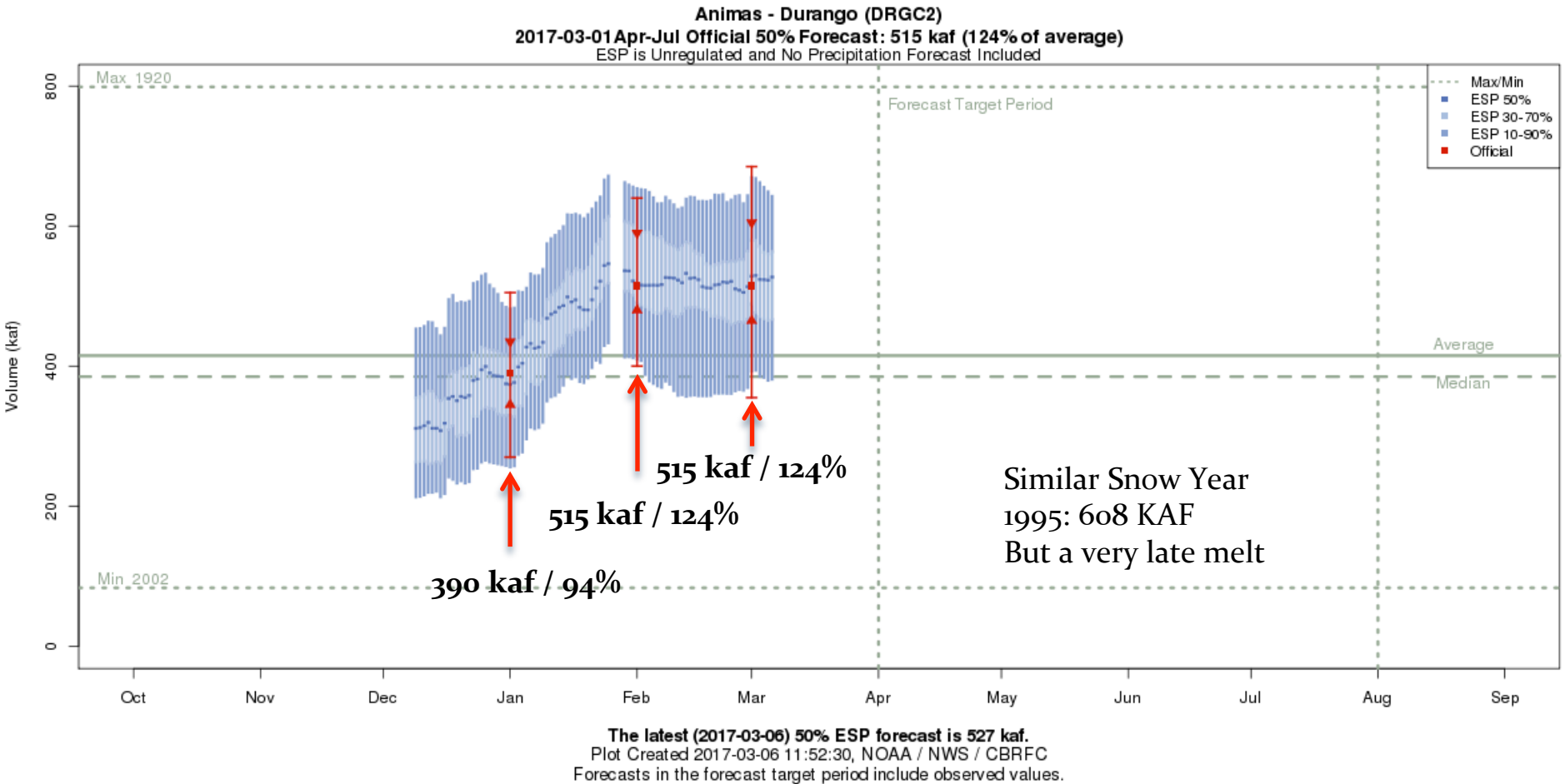
Forecast Evolution Plot: San Juan - Navajo Reservoir Inflow

San Juan - Navajo Res- Archuleta- Nr (NVRN5)
 2017-03-01 Apr-Jul Official 50% Forecast: 840 kaf (114% of average)
 ESP is Unregulated and No Precipitation Forecast Included



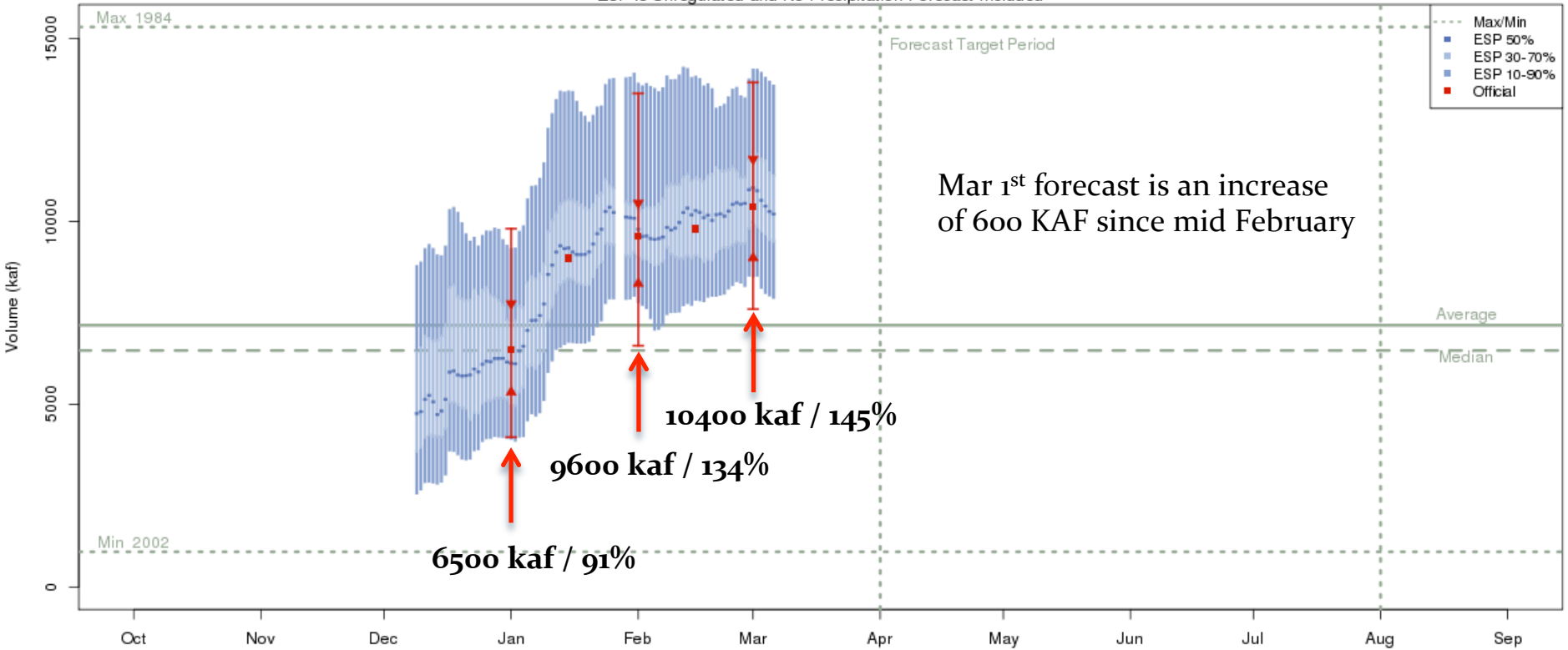
The latest (2017-03-06) 50% ESP forecast is 828 kaf.
 Plot Created 2017-03-06 12:08:08, NOAA / NWS / CBRFC
 Forecasts in the forecast target period include observed values.

Forecast Evolution Plot: Animas - Durango



Forecast Evolution Plot: Lake Powell Inflow

Colorado - Lake Powell- Glen Cyn Dam- At (GLDA3)
2017-03-01 Apr-Jul Official 50% Forecast: 10400 kaf (145% of average)
ESP is Unregulated and No Precipitation Forecast Included



The latest (2017-03-06) 50% ESP forecast is 10200 kaf.
Plot Created 2017-03-06 11:57:40, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

Forecast Validation: How good are forecasts in March ?

Historical Model Error 1981-2010

Not a significant change in model error Feb to Mar
- March can be a pivotal month

Forecasts are better than just going with average

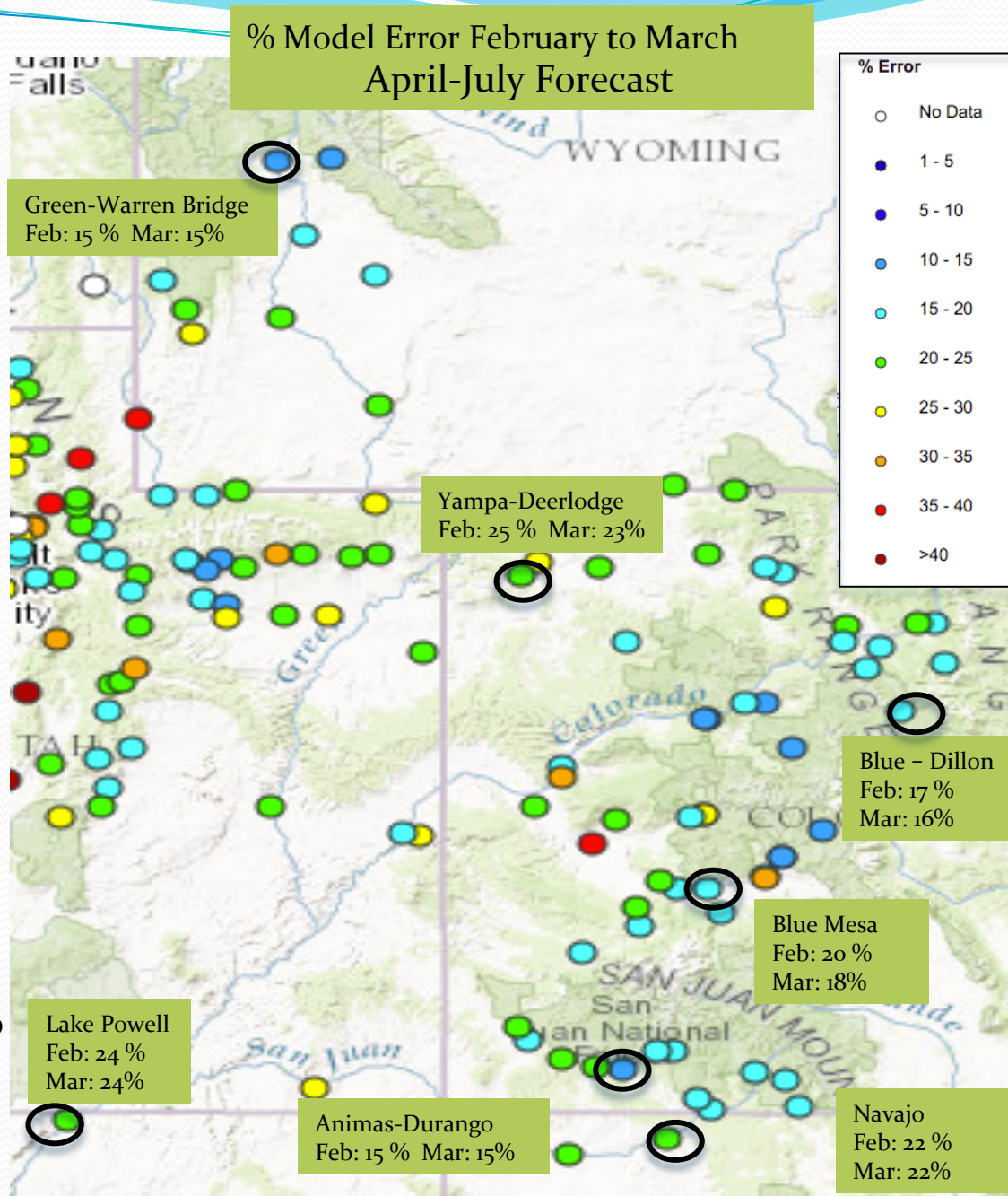
Error tends to decrease each month into the spring,
especially from this point forward.

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

Map is available at:
<https://www.cbrfc.noaa.gov/arc/verif/verif.php>

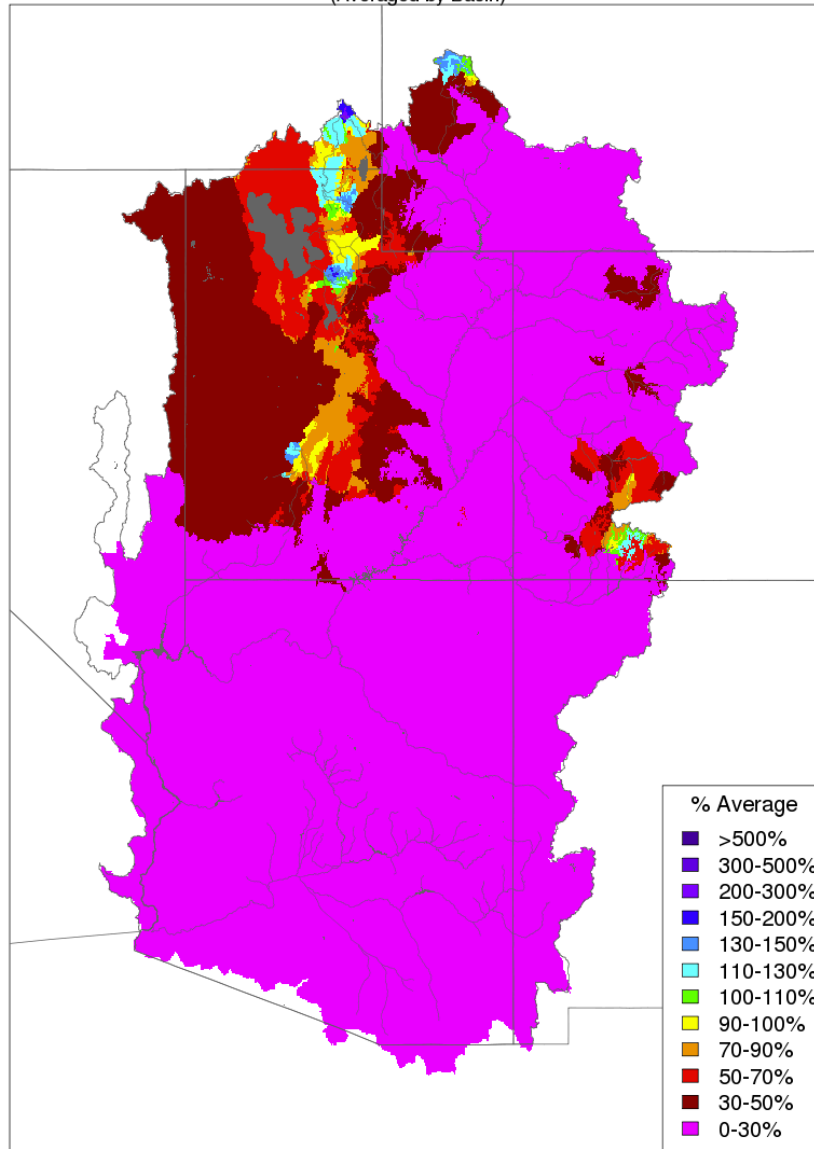
From Water Supply drop down menu
→ select Historical Verification Map



March Weather: Precipitation so far....

Month to Date Precipitation - March 06 2017

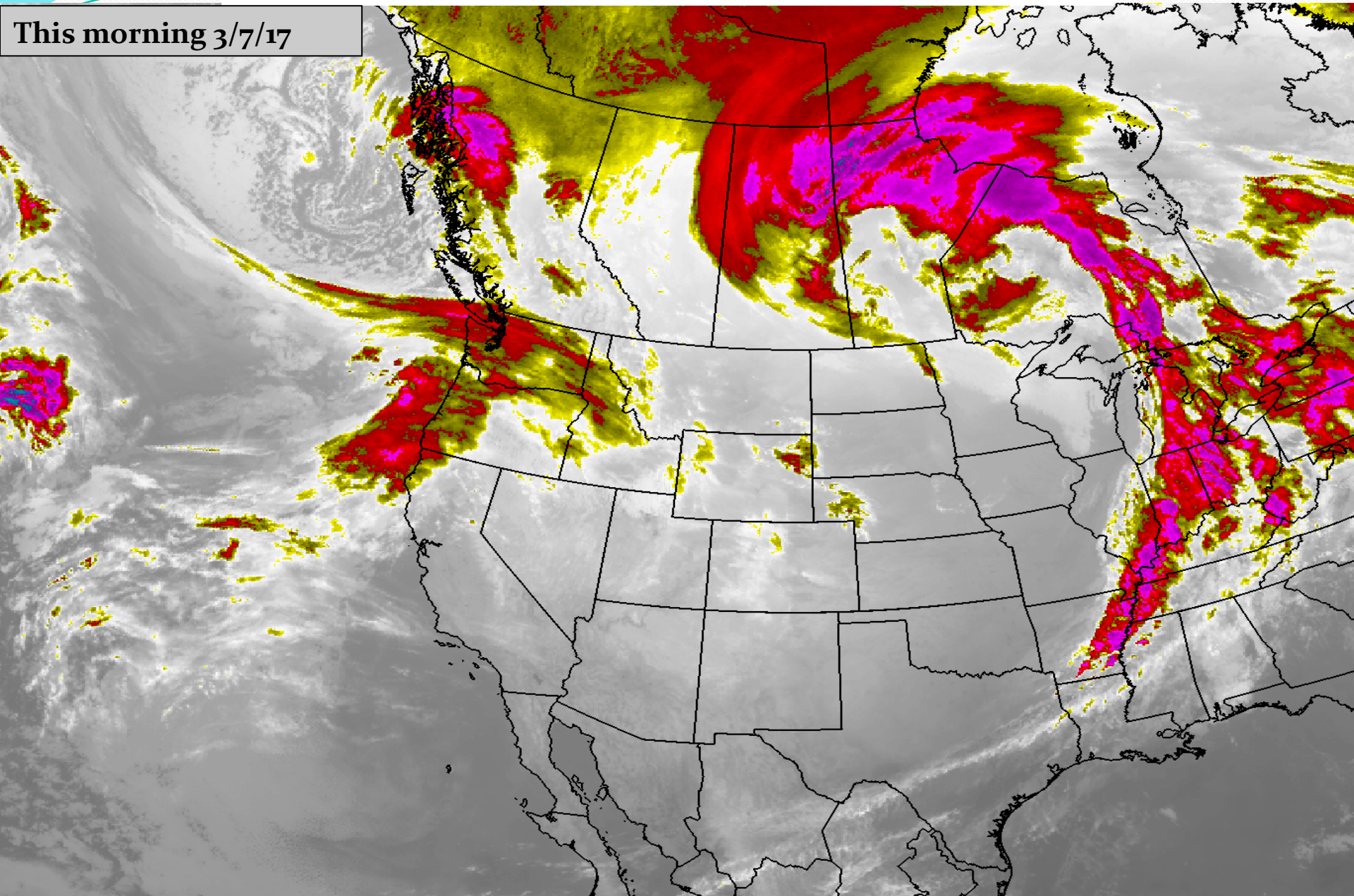
(Averaged by Basin)



Upcoming Weather and Impacts to Water Supply Forecasts

Westerly flow over the area with storm track to the north

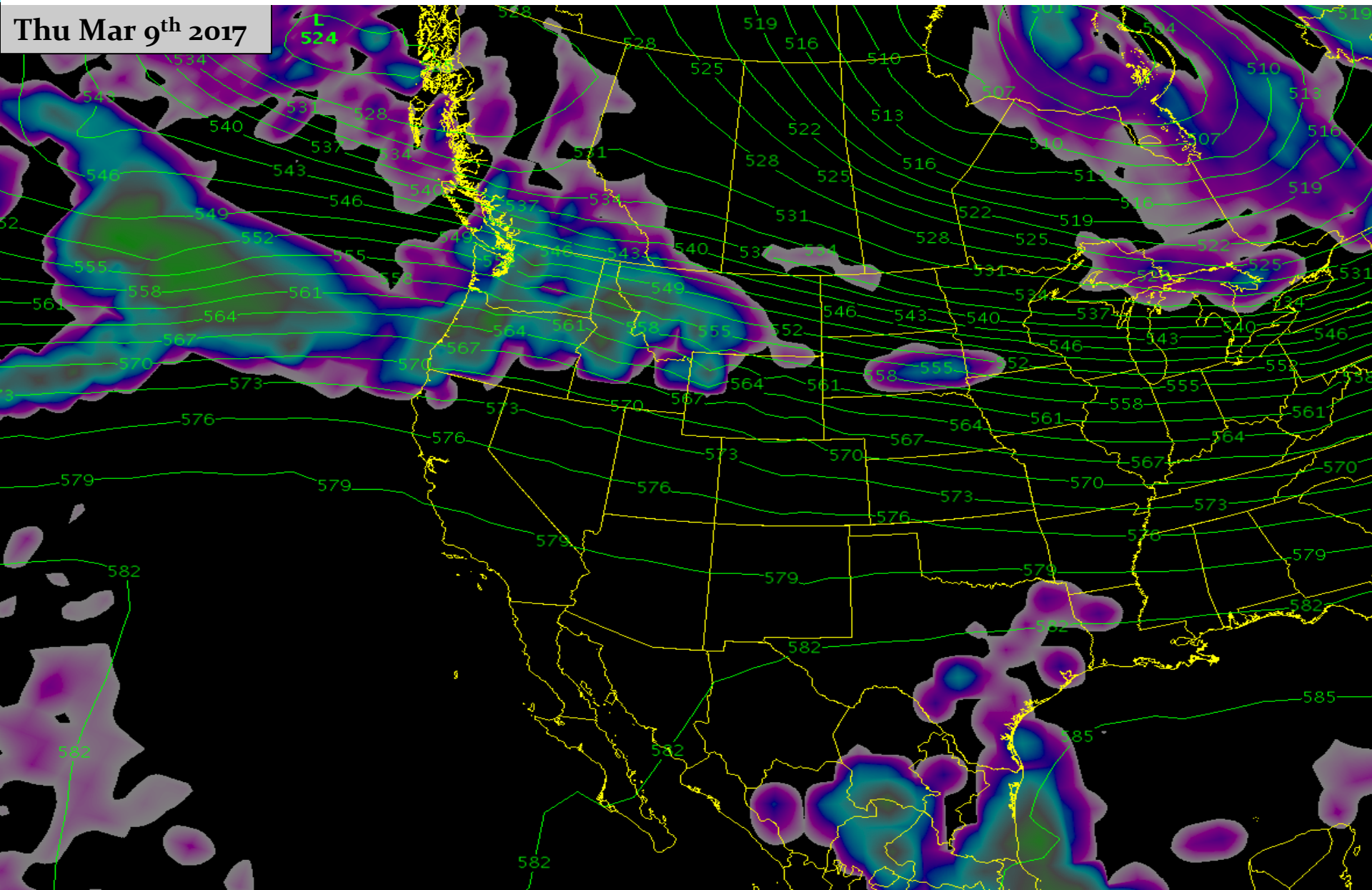
This morning 3/7/17



Upcoming Weather and Impacts to Water Supply Forecasts

Westerly flow continues over the area with storm systems displaced north. Increasingly mild air mass with temperatures 5-15 degrees above average for this time of year

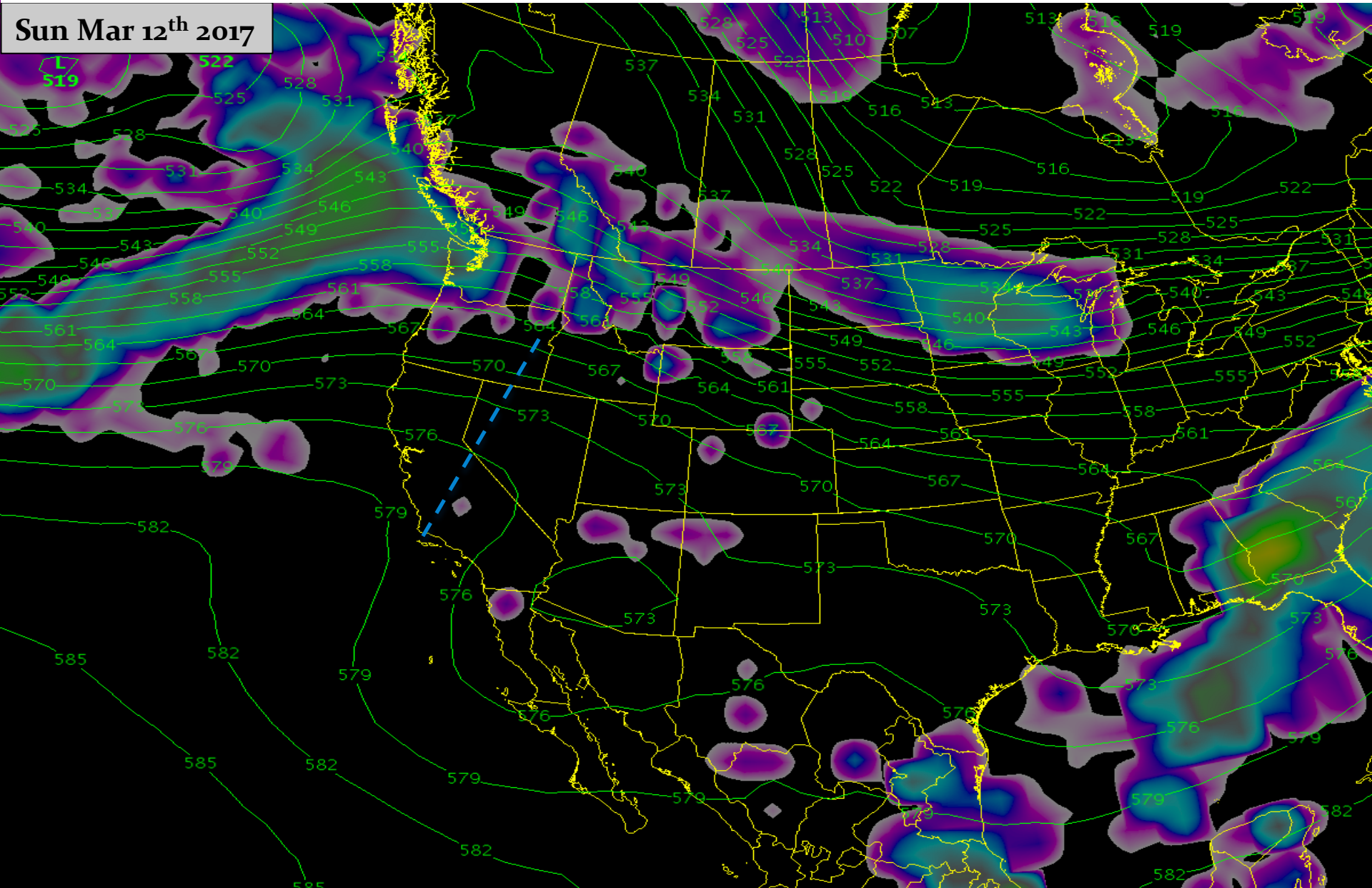
Thu Mar 9th 2017



Upcoming Weather and Impacts to Water Supply Forecasts

This model suggests the storm track remains to the north of the area. Other solutions have the high pressure ridge farther west. That scenario would allow our northern areas to become more susceptible to storm activity.

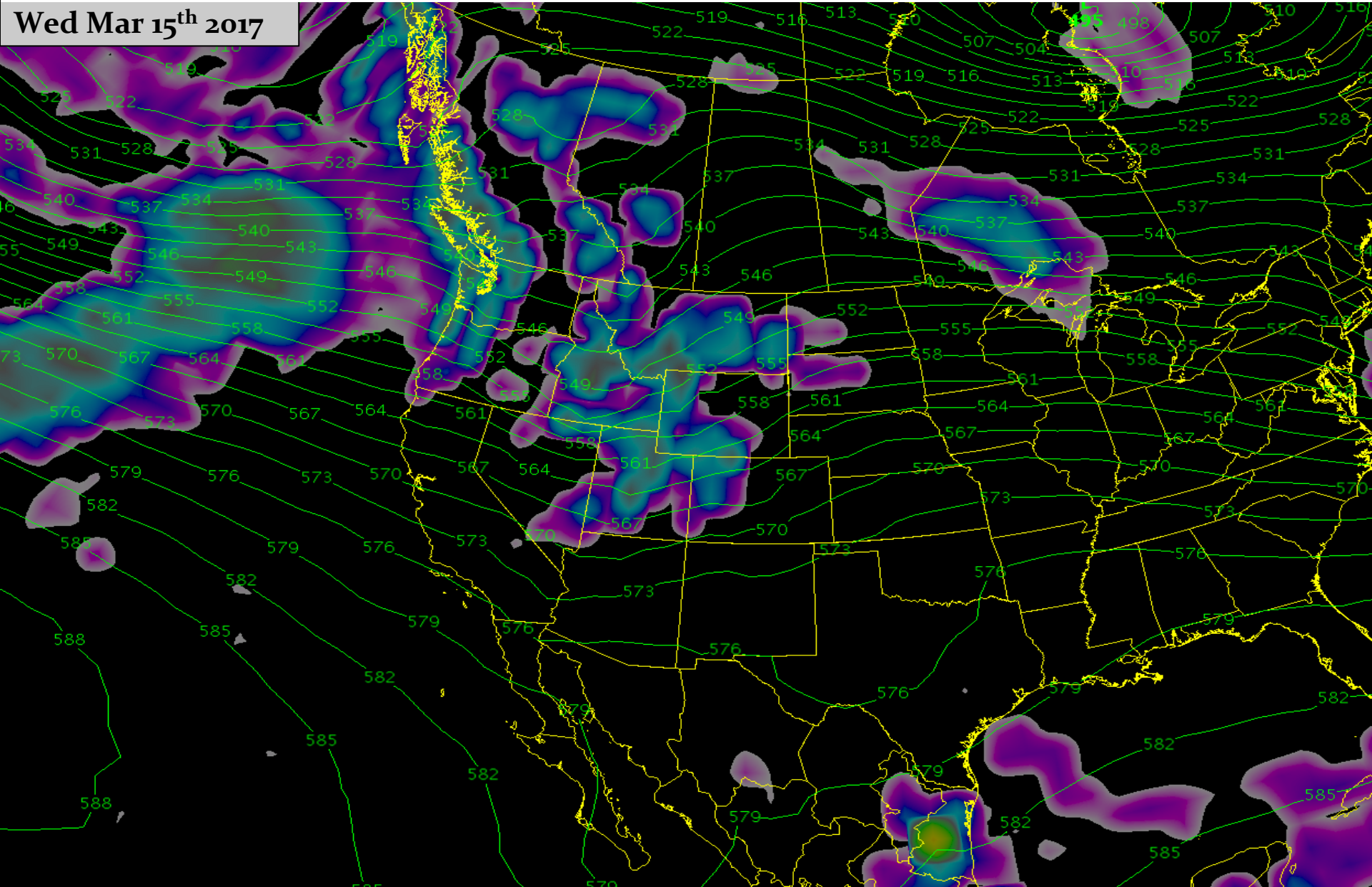
Sun Mar 12th 2017



Upcoming Weather and Impacts to Water Supply Forecasts

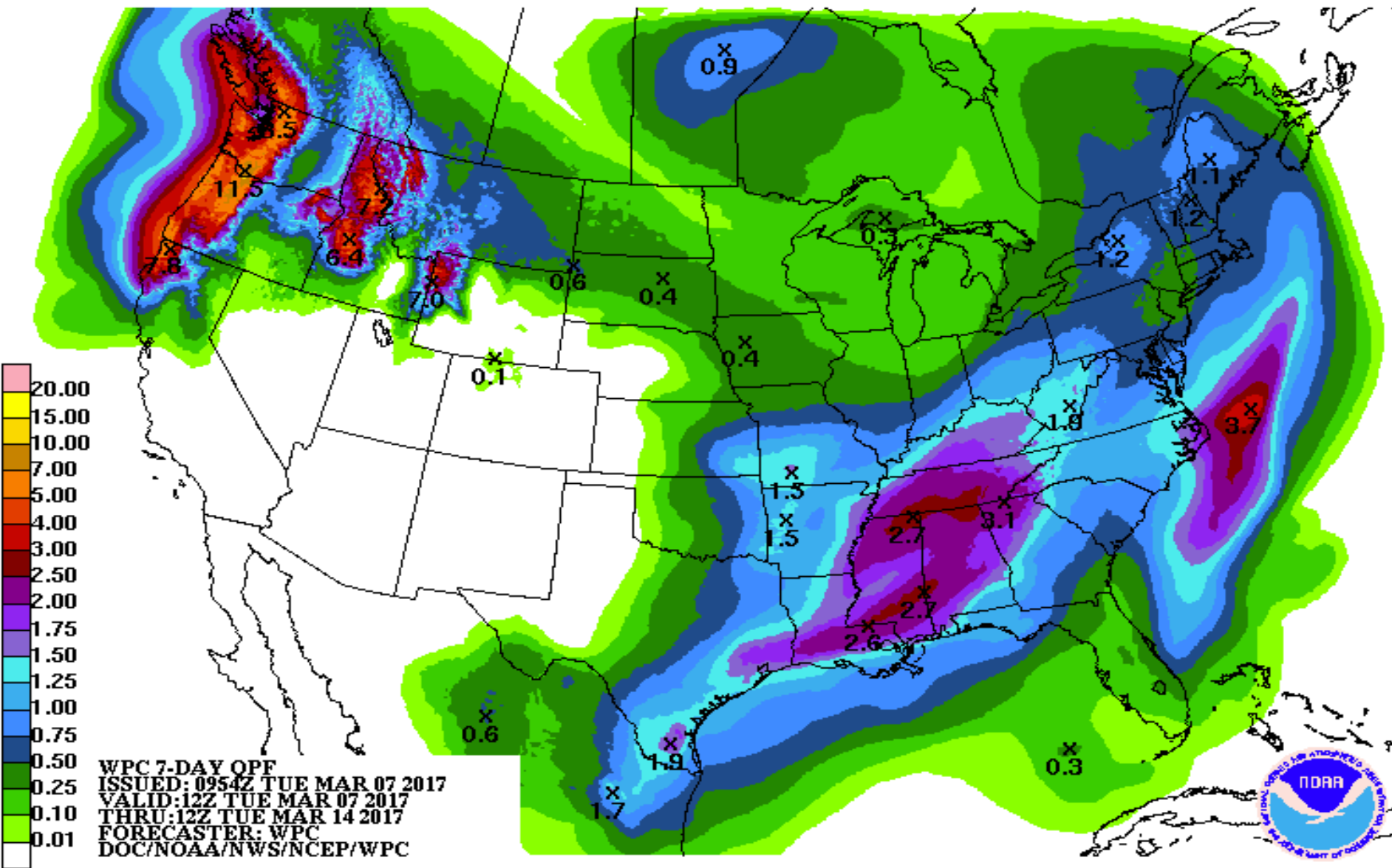
The next legitimate threat for any significant precipitation looks to be the middle of next week. Models differ on the intensity of the storm system but it does appear more active. However southern areas remain on the dry side.

Wed Mar 15th 2017



Upcoming Weather and Impacts to Water Supply Forecasts

Precipitation Forecast: 7 day total (Mar 7th-Mar 14th)



Key Points

Significant runoff is anticipated particularly in the Upper Green River Basin, Duchesne River Basin, Dolores River Basin, & Gunnison Basin headwaters.

Even if conditions turn dry these areas are still likely to have much above average runoff. Greatest impacts of dry weather to water supply forecasts would be in parts of the Yampa, Colorado Mainstem, and San Juan River Basins.

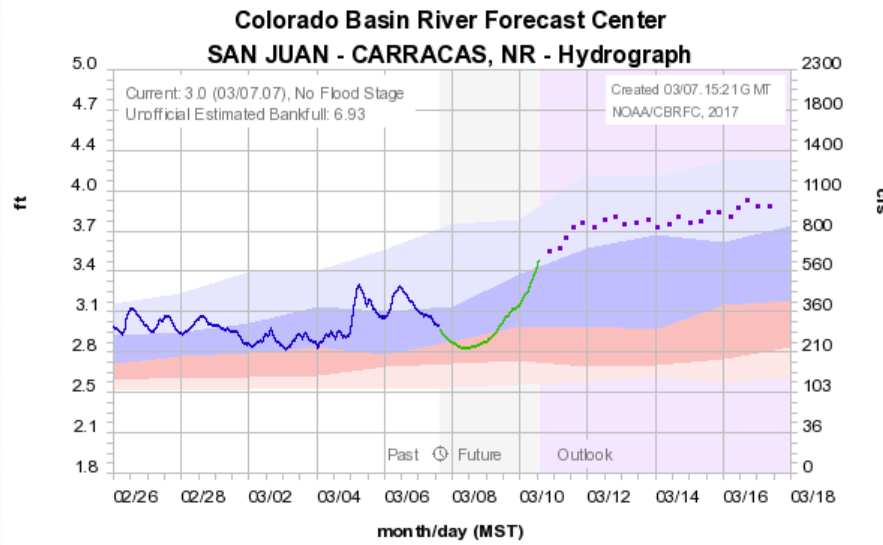
March is starting off dry and will most likely be below average through the middle of the month. An important factor will be temperatures and how much snowpack is retained through the month.

Mid-Month water supply guidance is unlikely to increase and will probably decrease some in many areas.

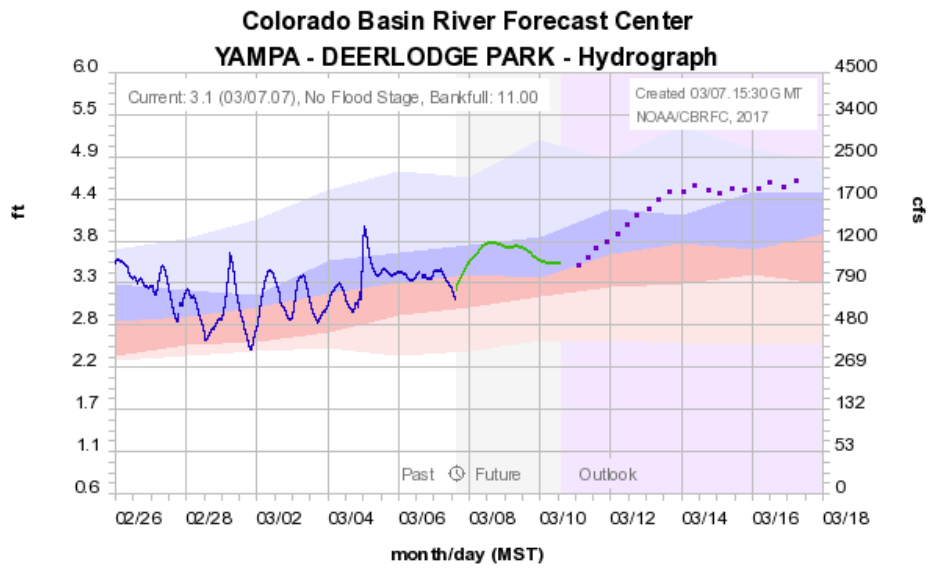
CBRFC deterministic model is indicating some streams starting to increase by next week due to snow melt. These are generally lower elevation basins and southern basins (Virgin, Dolores, San Juan) and in line with seasonal rises.

We are also seeing active reservoir operation activity in anticipation of the high inflow forecasts.

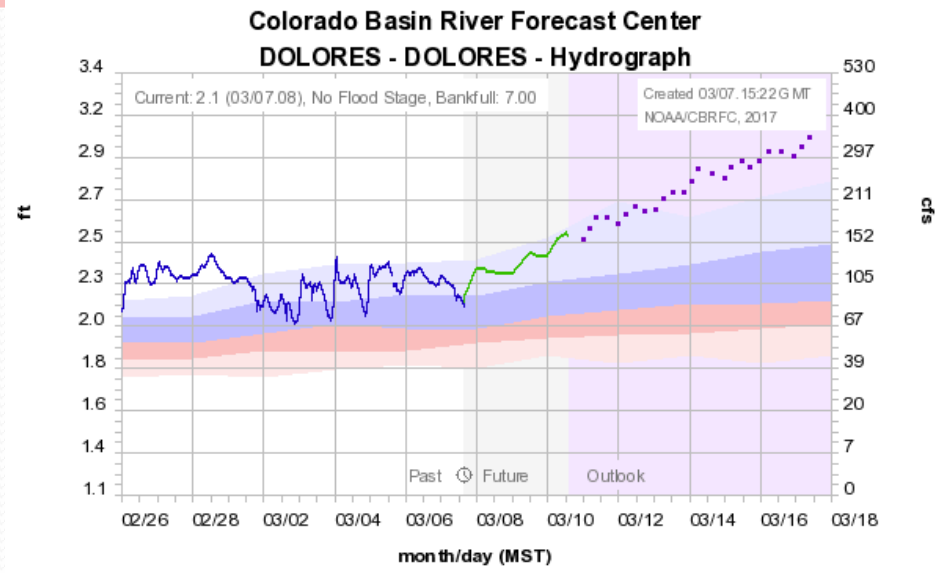
Stream flow increases as forecast by the CBRFC deterministic model



Observed — Forecast (03/07.14:00) — Outlook (increasing uncertainty) ···
 Historical Exceedance Probability (USGS): 90-75% 75-50% 50-25% 25-10%



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2017 water supply briefing schedule

- 2017 monthly water supply briefings for the Colorado River Basin
 - Thursday Apr 6th @ 11 am MT
 - Friday May 5th @ 11 am MT
 - Great Basin webinars are same dates at 1:30 pm MT
 - *NEXT UP: Today 1:30 pm*
- Peak flow briefing: *Friday March 10th @ 10 am MT*
- Date/Times are subject to change. All registration information has been posted to the CBRFC web page.

CBRFC Water Supply Contacts

Please contact us with any questions

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