# January 2018
# Colorado River Basin Water Supply Briefing

Jan 8, 2017

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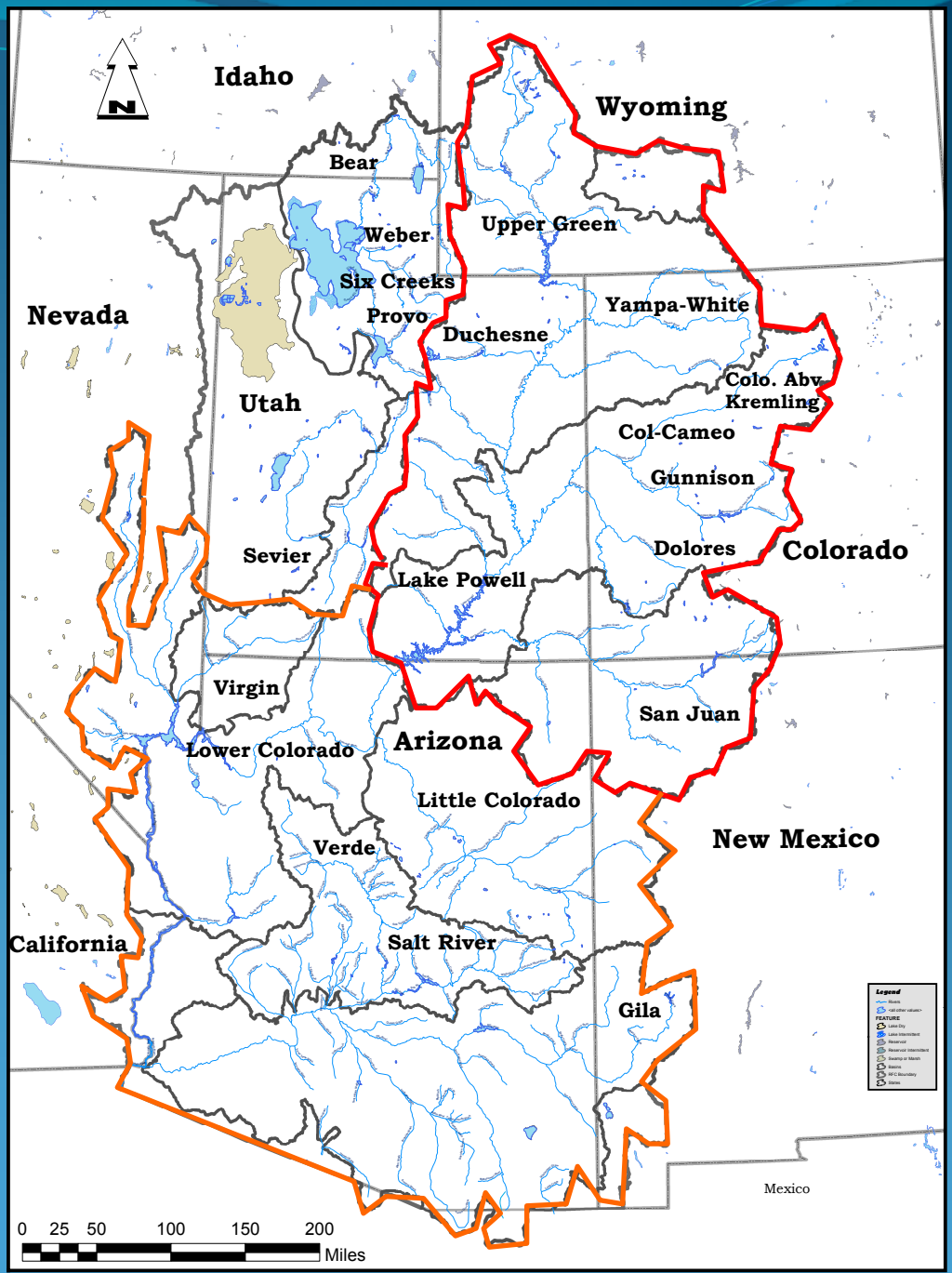
Colorado Basin River Forecast Center
National Weather Service
NOAA

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

**Passcode: 1706374**

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

## CBRFC Forecast Areas



# Today's Presentation

Fall and early winter weather – A very dry pattern

Current snowpack conditions-Record low snowpack in many locations

Initial 2018 water supply forecasts

New forecast evolution plots

January forecast – How good are they?

Upcoming weather – potential impacts to water supply forecasts

Contacts & Questions

**Phone: 1-877-929-0660 Passcode: 1706374**

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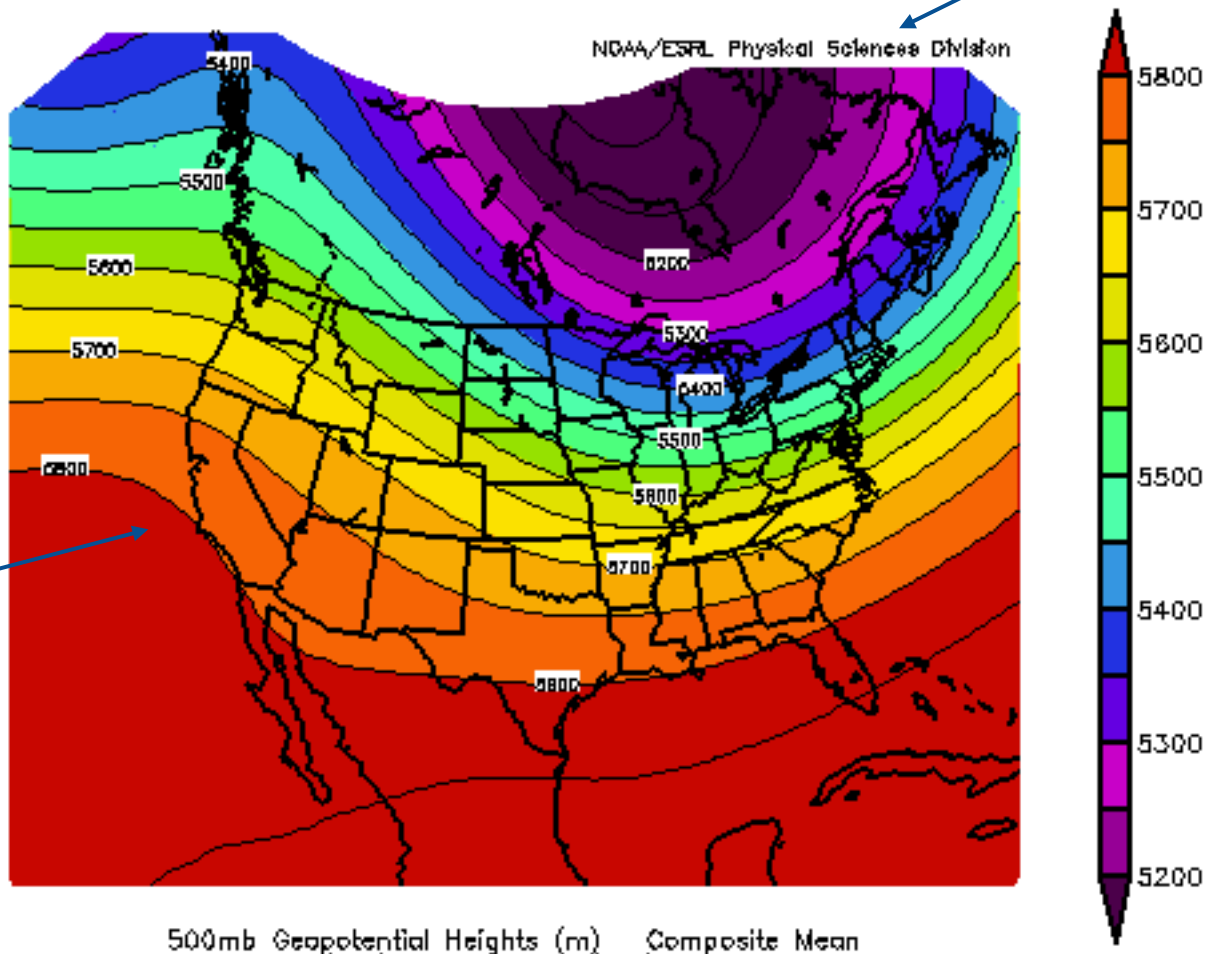
# Fall/Early Winter Weather Impacts

Very dry pattern becomes established

Mean Atmospheric Pattern
Mid Nov –through December

Strong Hudson Bay Low




Strong ridge in the west

500mb Geopotential Heights (m) Composite Mean
11/20/17 12z to 12/31/17 12z
NCEP/NCAR Reanalysis

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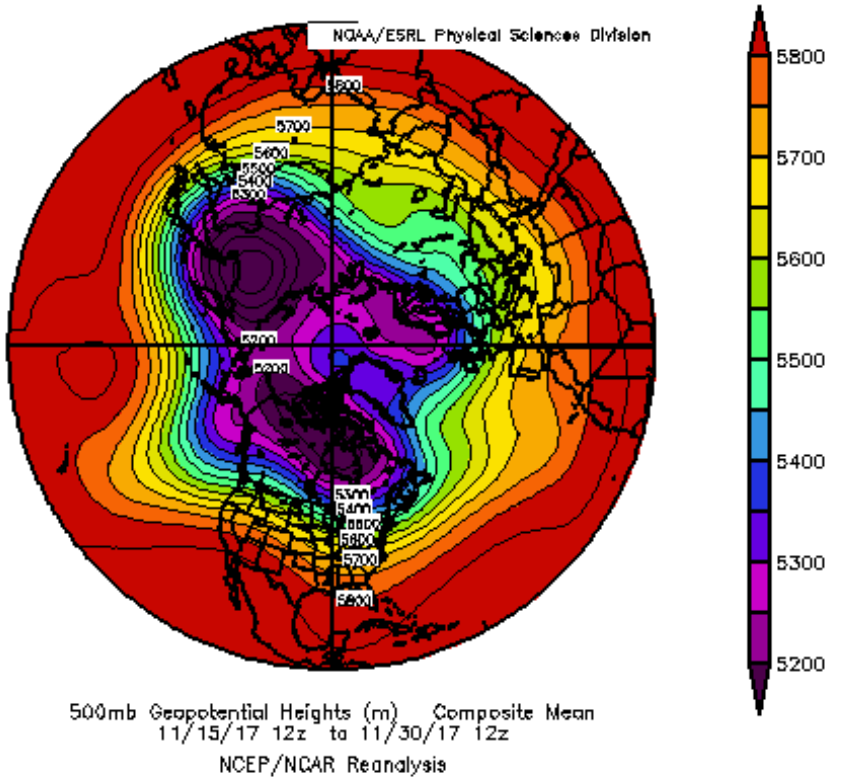
# Fall/Early Winter Weather Impacts

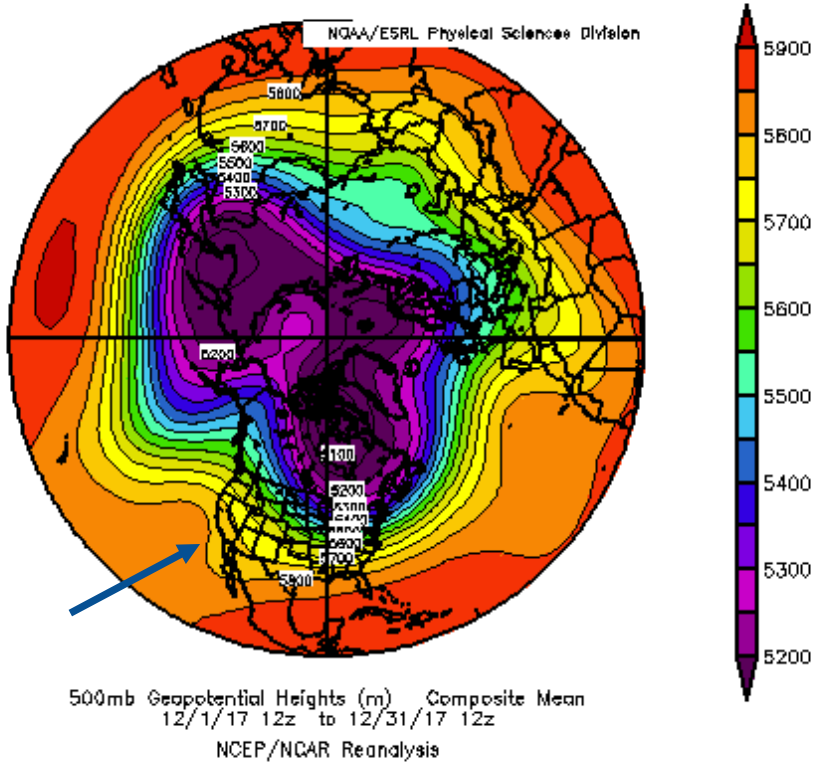
## Very dry pattern becomes established

Mean Atmospheric Pattern
Nov 15 – Nov 30




Dry conditions as a strong high pressure ridge becomes dominant feature over western U.S. / Pacific.

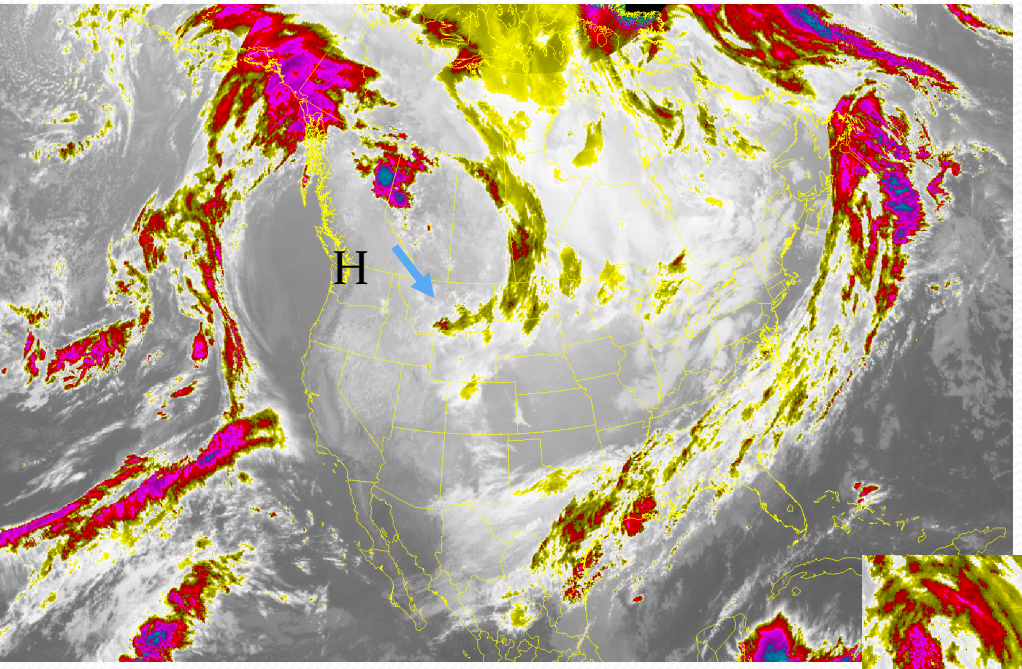
*"**Mean**"* Atmospheric Pattern
Dec 1 – Dec 31




Blocking high pressure ridge firmly established

# Fall/Early Winter Weather Impacts

Storms impacted by a persistent strong high pressure

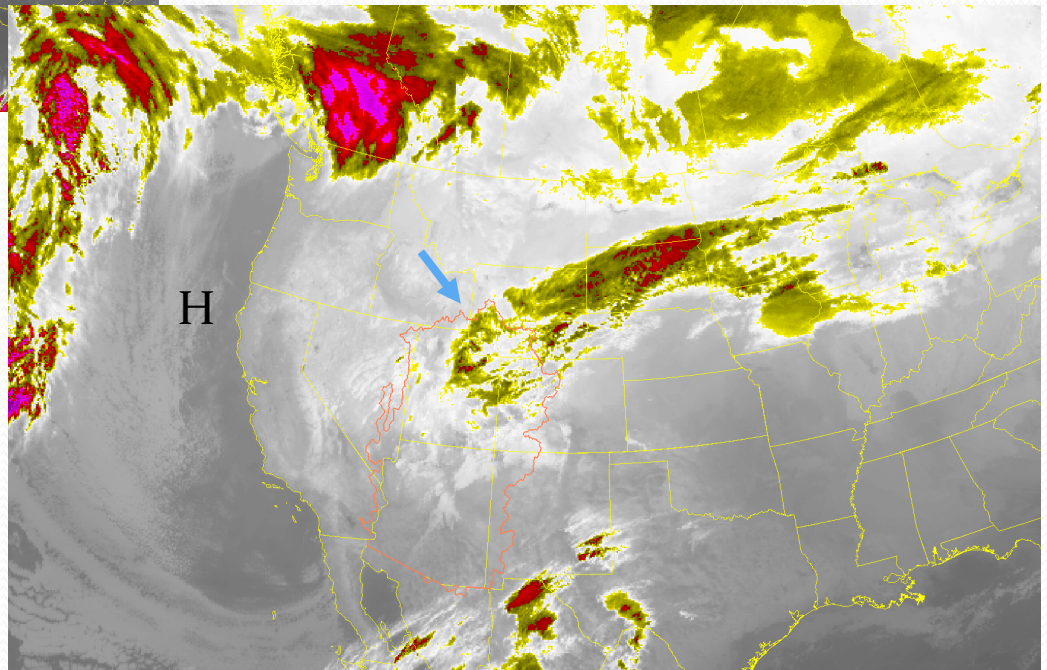



December 7th 2017

Storm system moving around the periphery of the high pressure ridge

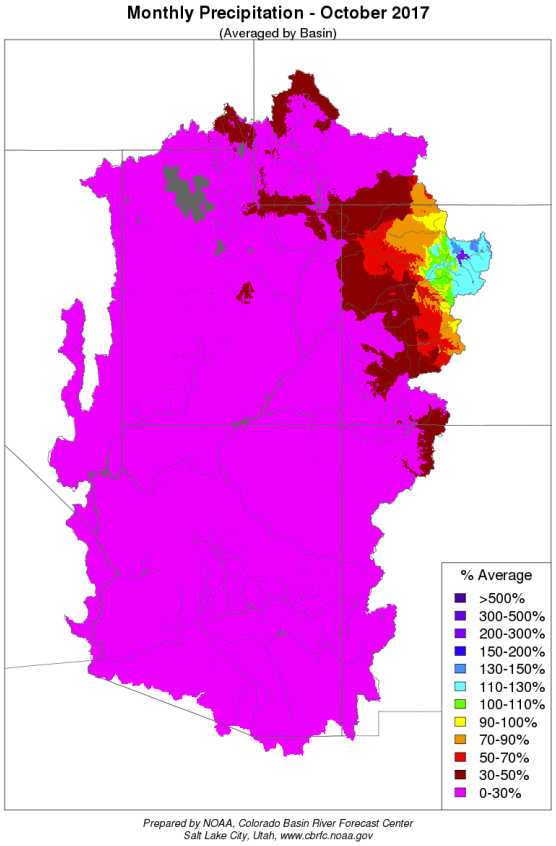
December 21st 2017

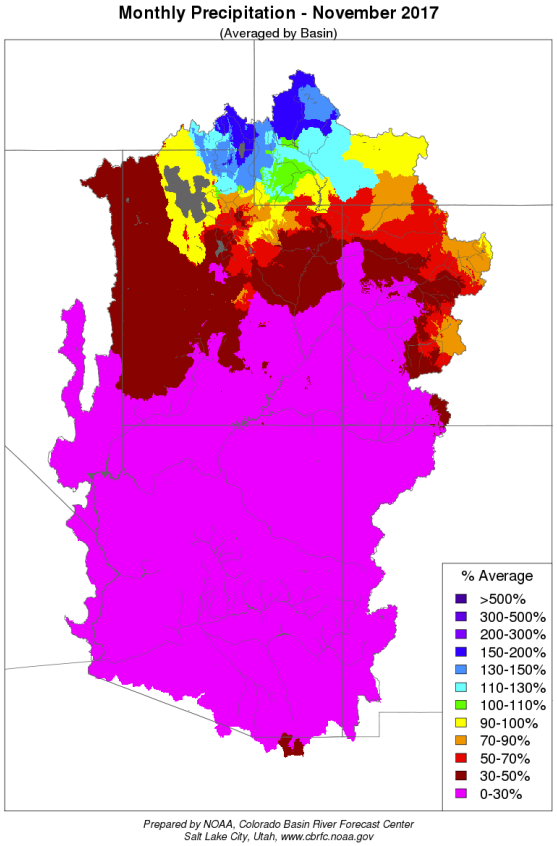
Weak storm system moving through the area with limited precipitation

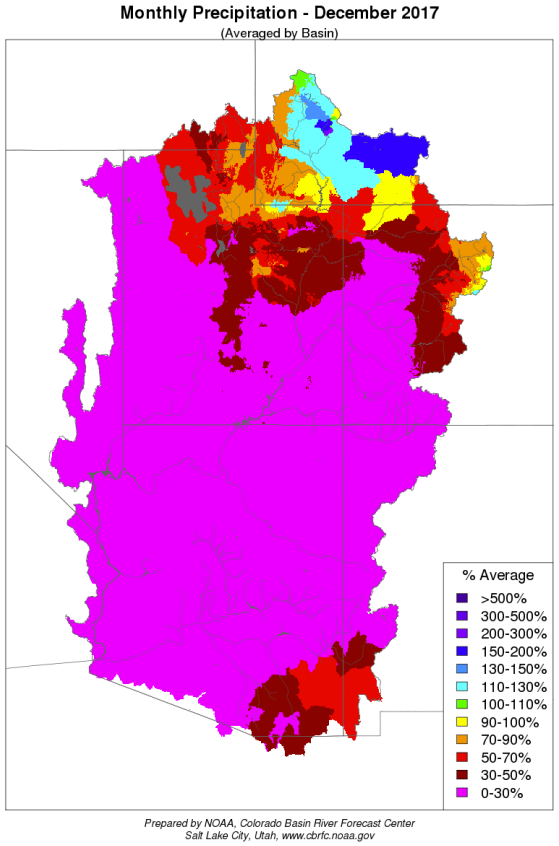


# Monthly Precipitation

Positive precipitation impacts limited to areas along the northern and eastern boundaries of the CBRFC forecast area



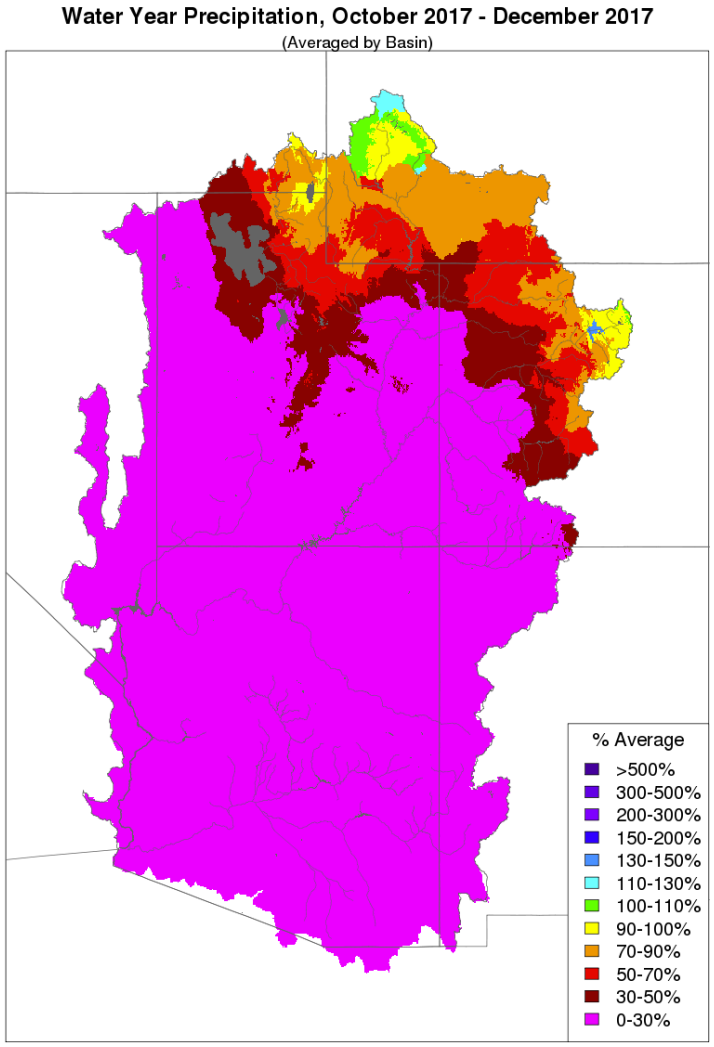



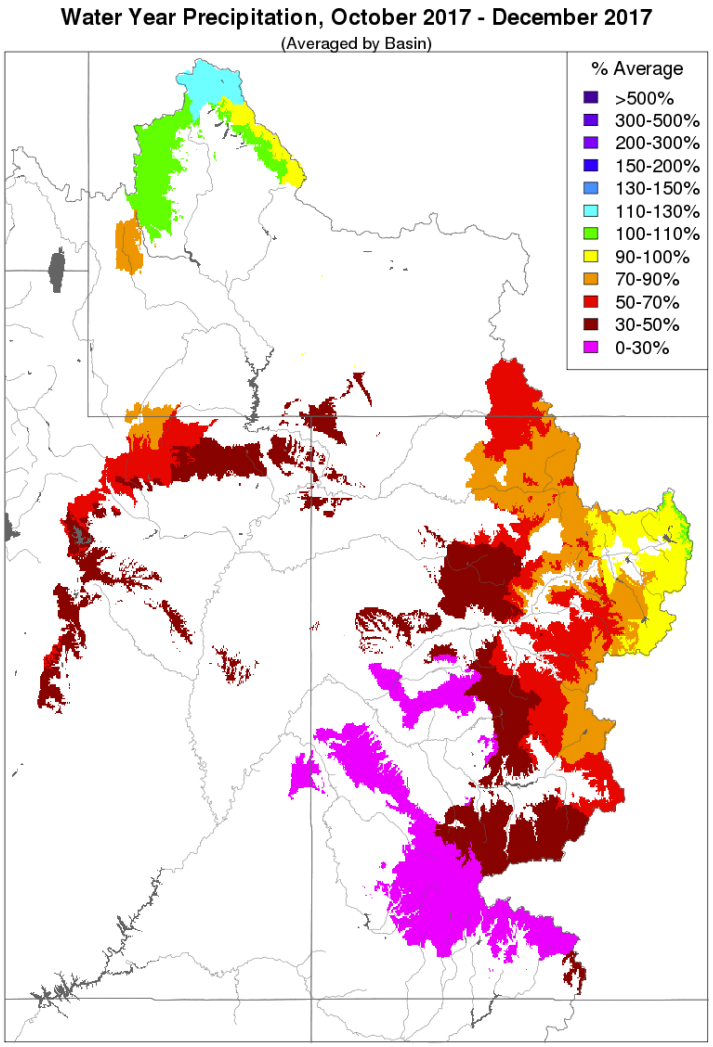
# Precipitation

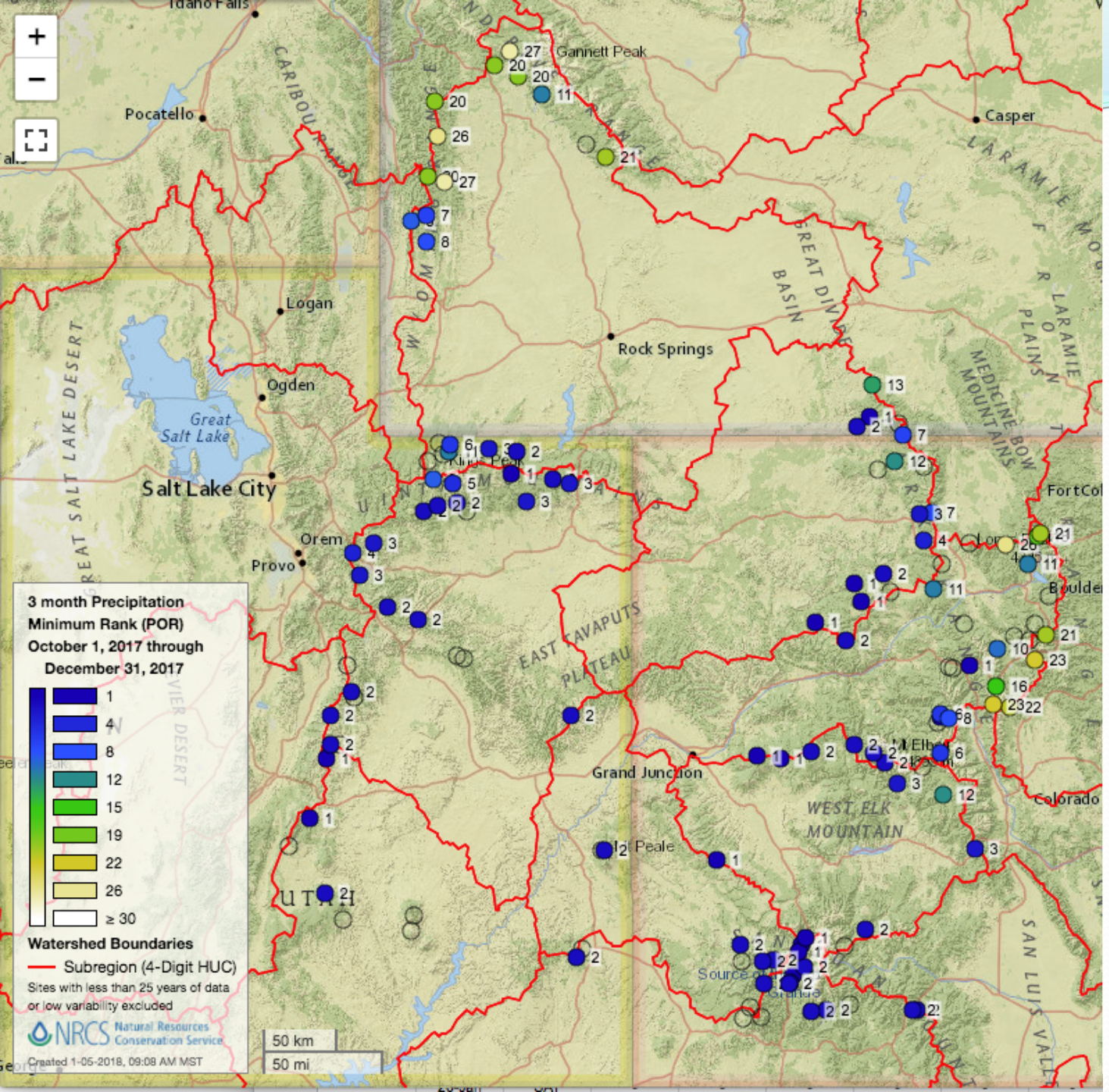
## Water Year (Oct-Dec) Precipitation

### Entire forecast area




### Primary contributing areas to April-July snowmelt runoff






# Oct-Dec 2017 Precipitation Ranking

**NRCS SNOTEL Network**

Minimum 25 years of record displayed

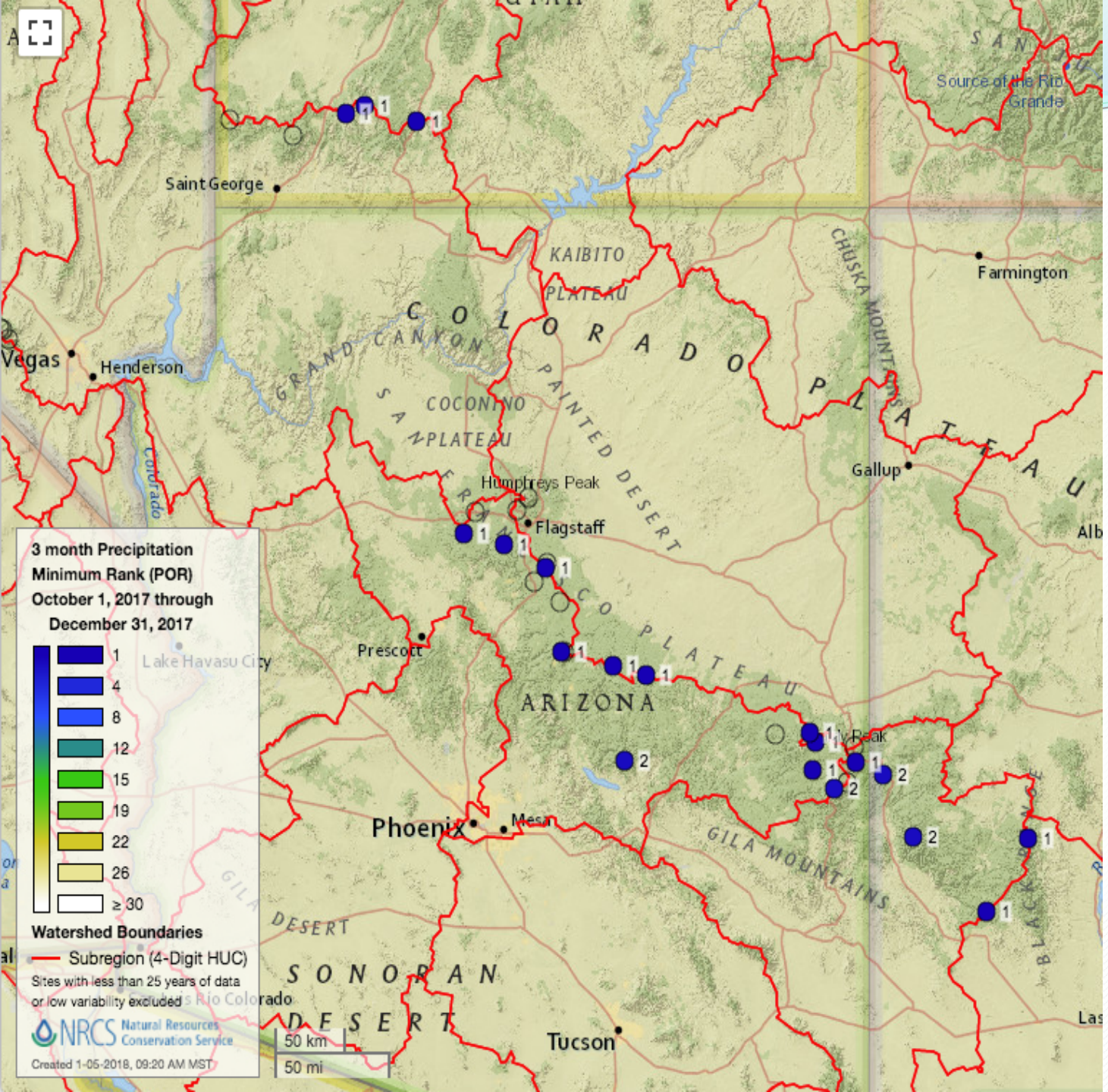
Most sites have a 32-40 year period of record

Many sites in the bottom 3 of record

<u>Exceptions:</u>

Northern Green headwaters

Eastern headwaters of Colorado Mainstem




# Oct-Dec 2017 Precipitation Ranking

**NRCS SNOTEL Network (Lower Colorado Basin)**

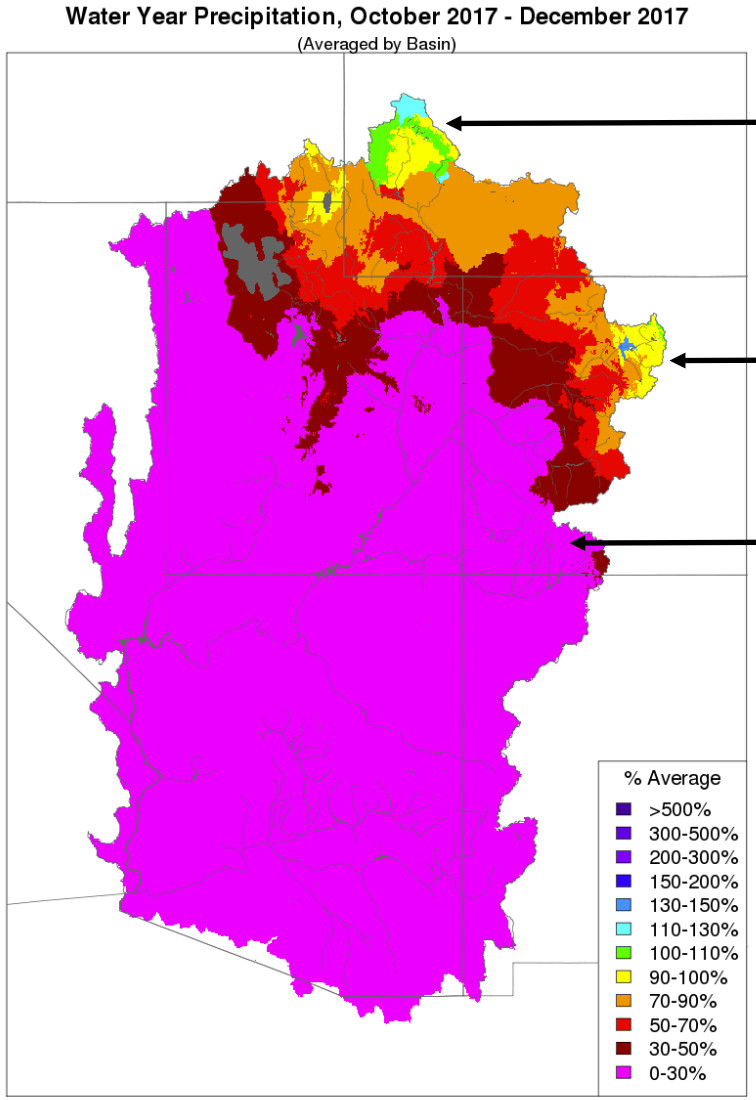
Minimum 25 years of record displayed

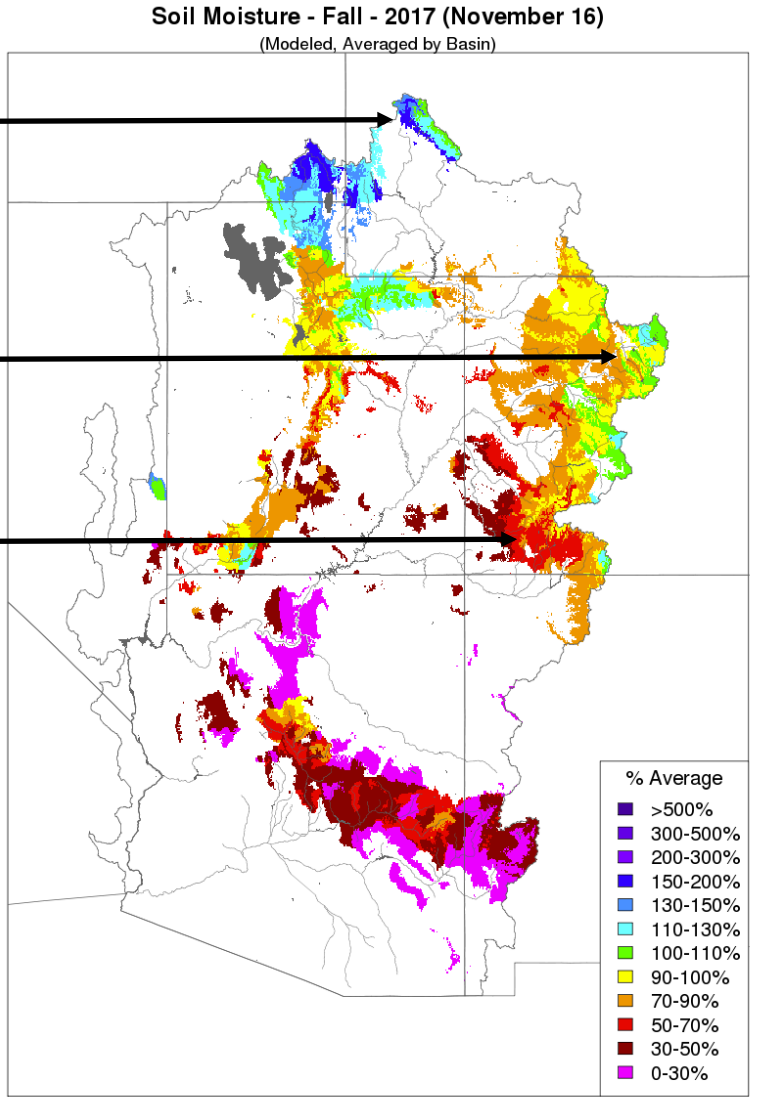
Most sites have a 32-40 year period of record

All sites in the bottom 2 of record. Most sites the lowest in their period of record.

# Fall/Early Winter Weather Impacts

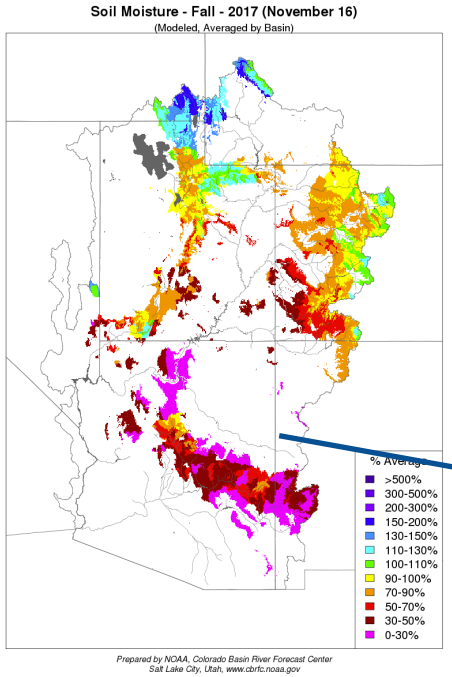
## Seasonal Precipitation / Soil Moisture Conditions
## (where do they show the same signal)

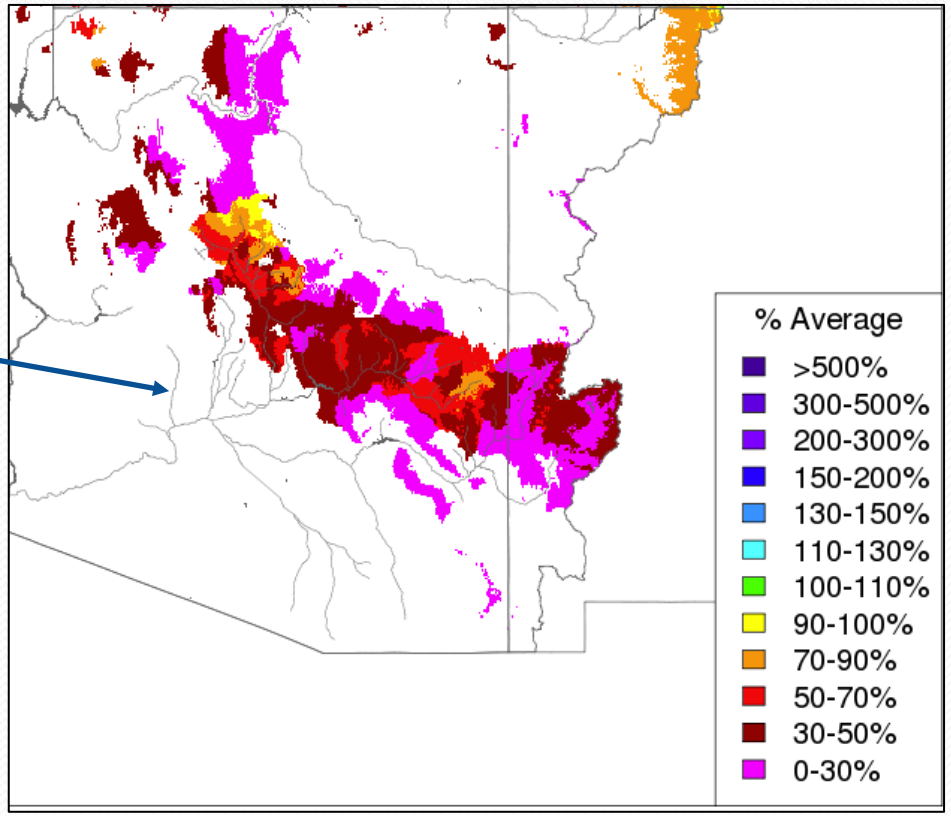


# Fall/Early Winter Weather Impacts

## Lower Colorado Basin Soil Moisture Conditions

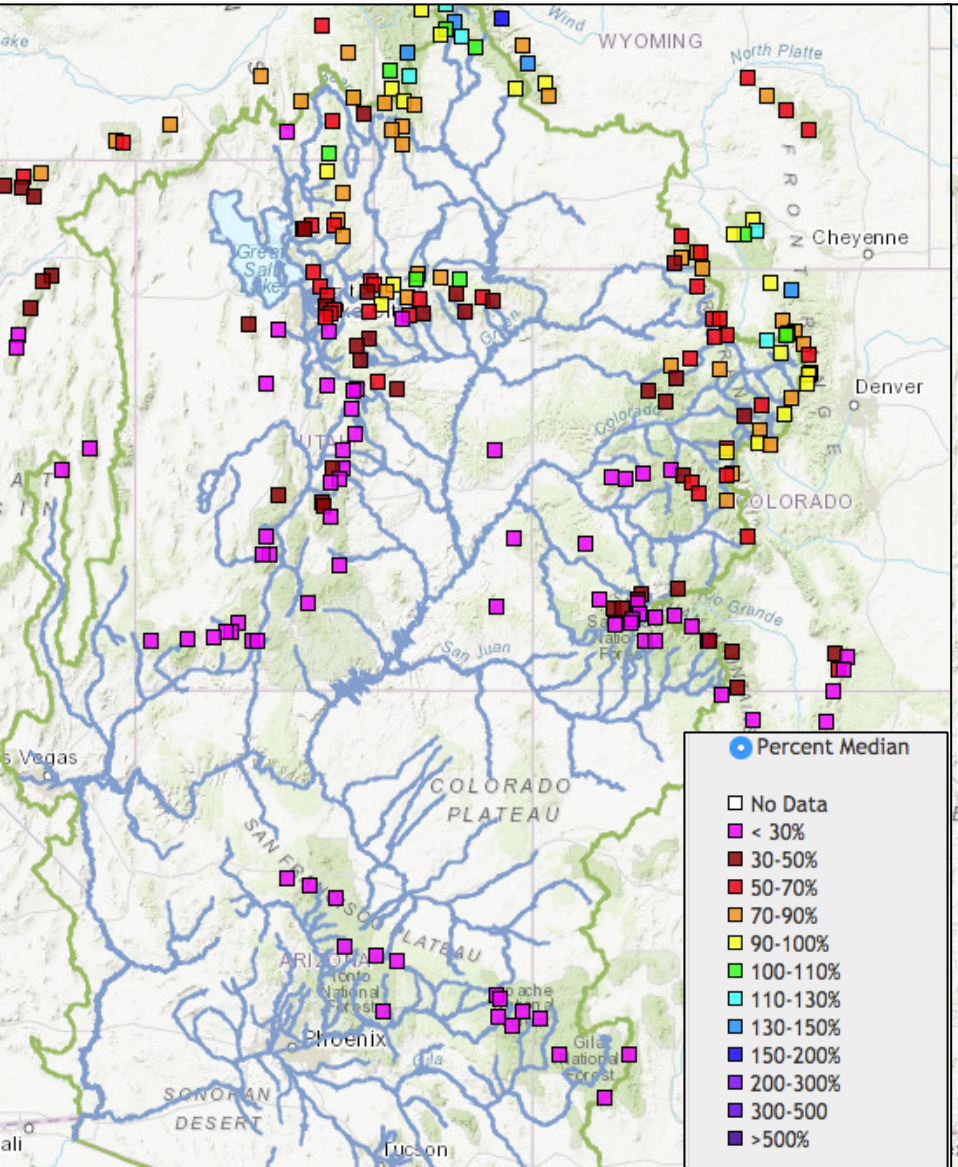



Below average monthly precipitation dates back to August for many areas
Any precipitation events are unlikely to product significant runoff initially
Snowmelt likely absorbed into the soil (If it snows)

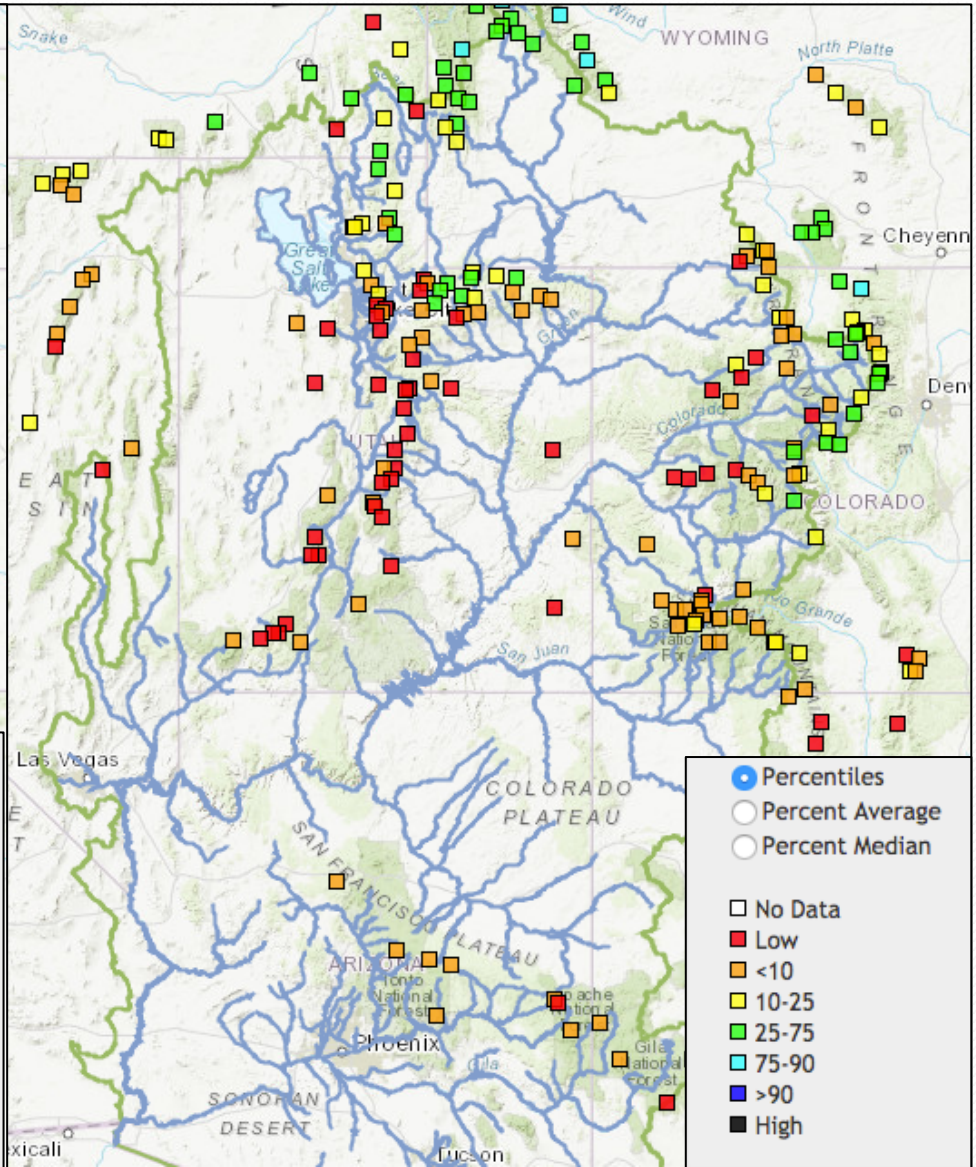
# Snow Conditions
# January 8 2018

## Snow Water Equivalent (% median)

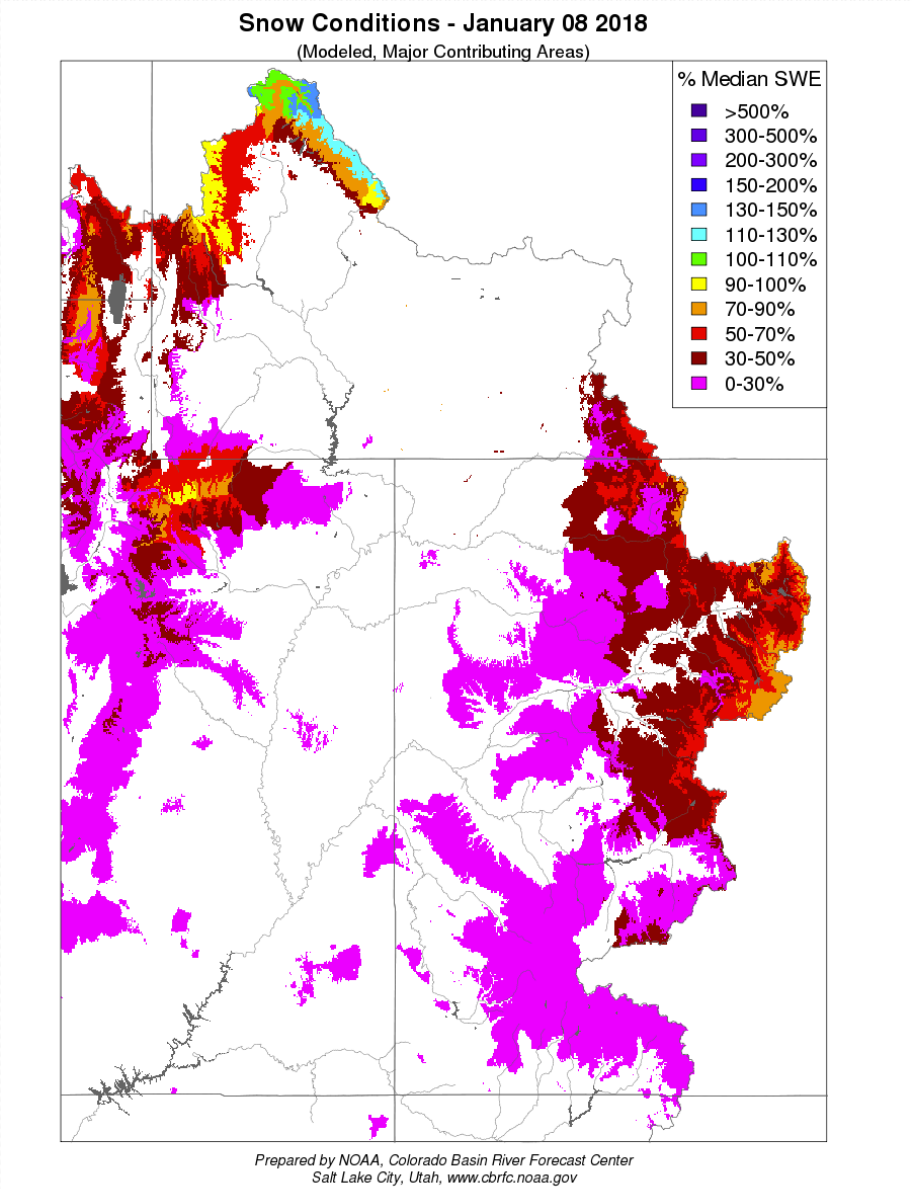



## SWE historical ranking

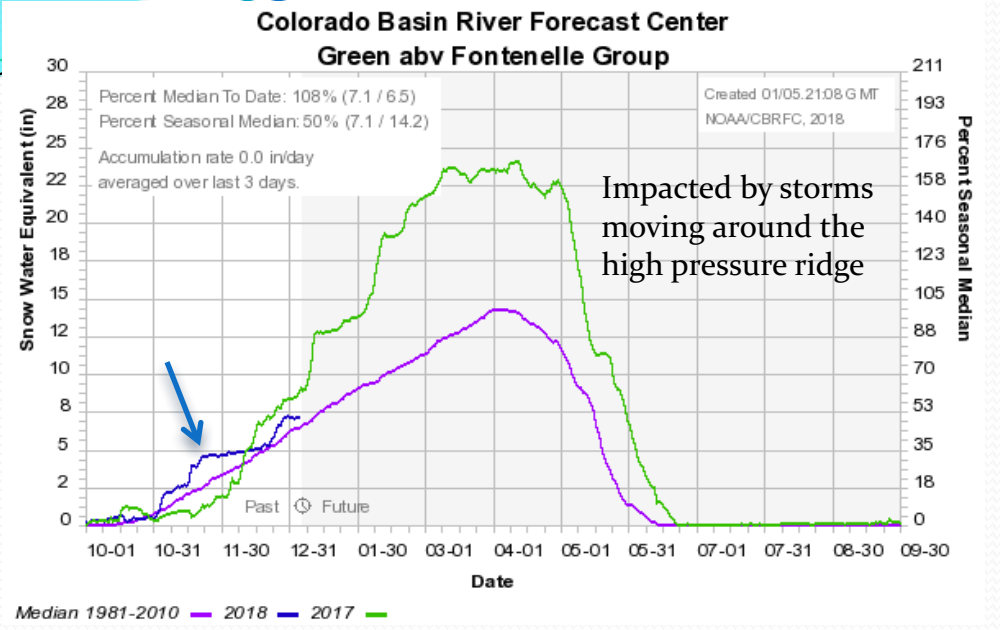
Red – Lowest on record
Orange - Many in bottom 3 of record

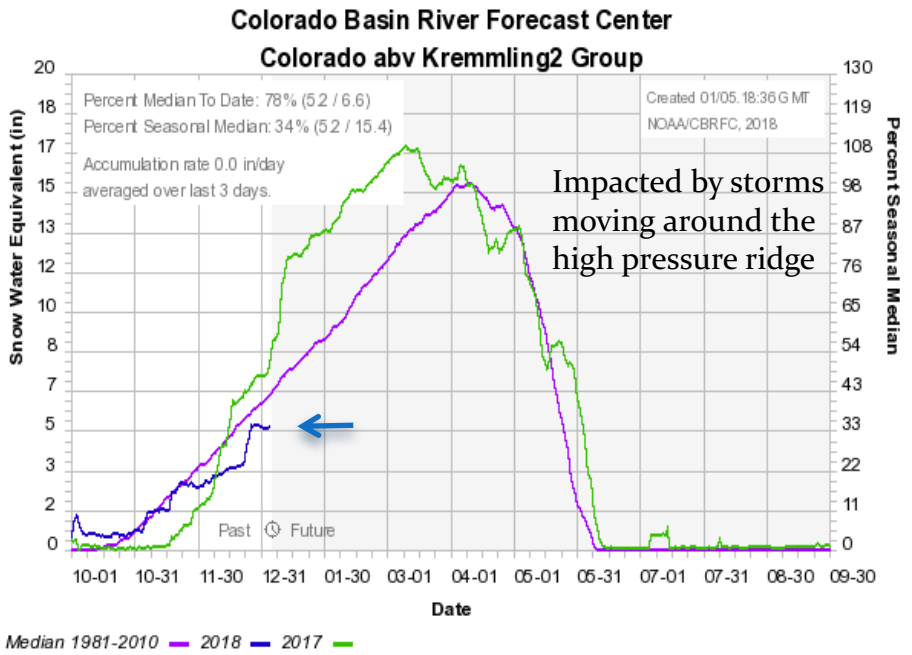


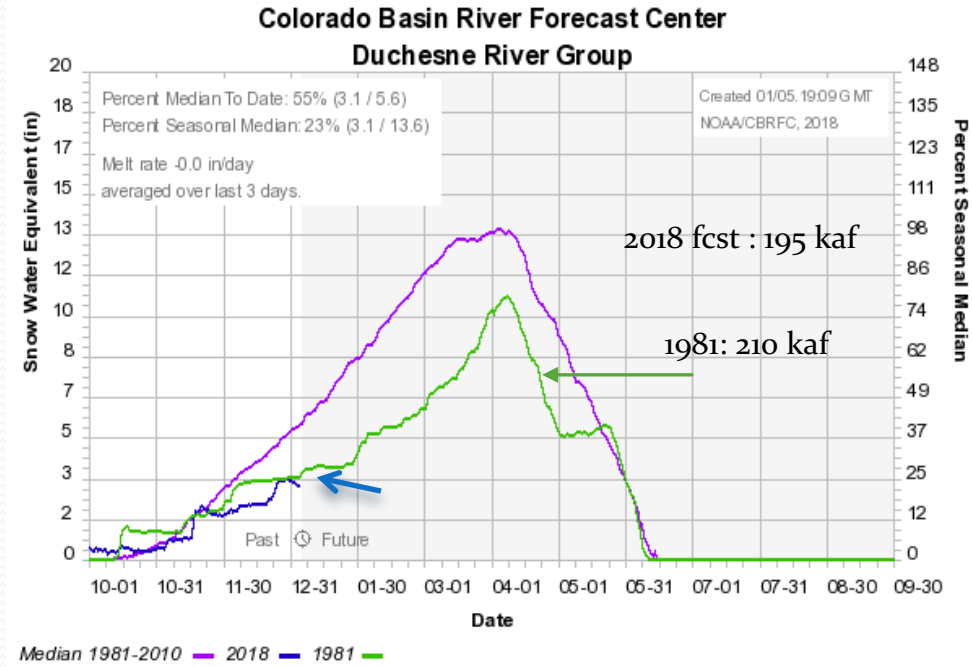
# Snow Conditions (Hydrologic Model) January 8 2018

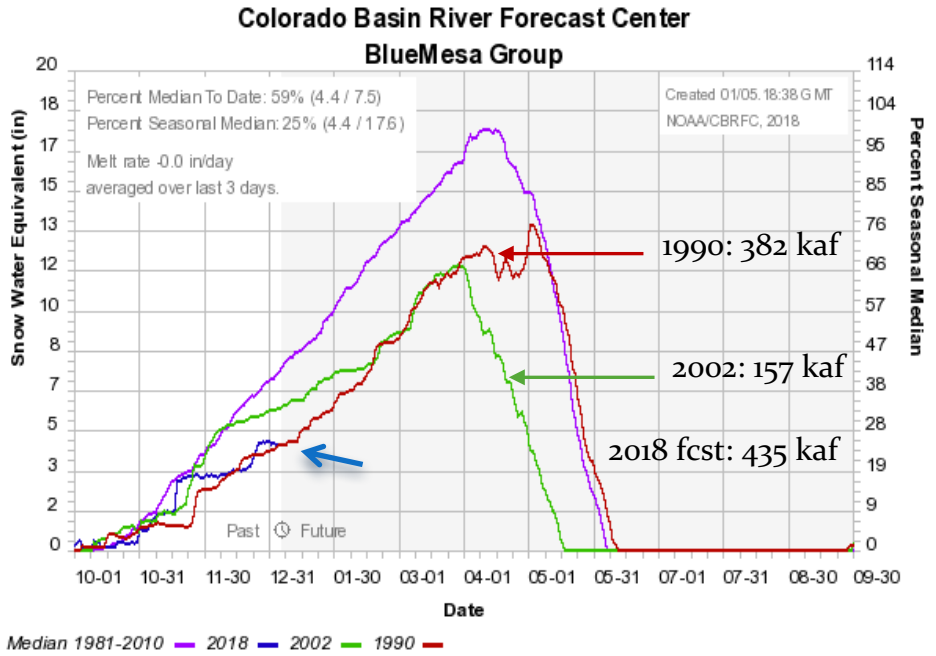


# Snow Conditions: SNOTEL Groups

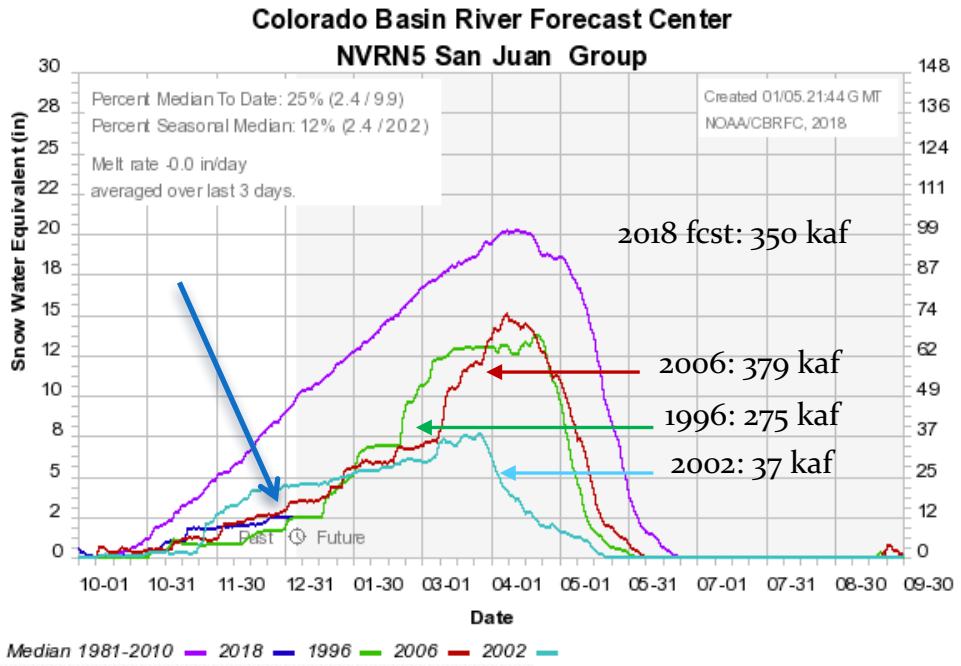


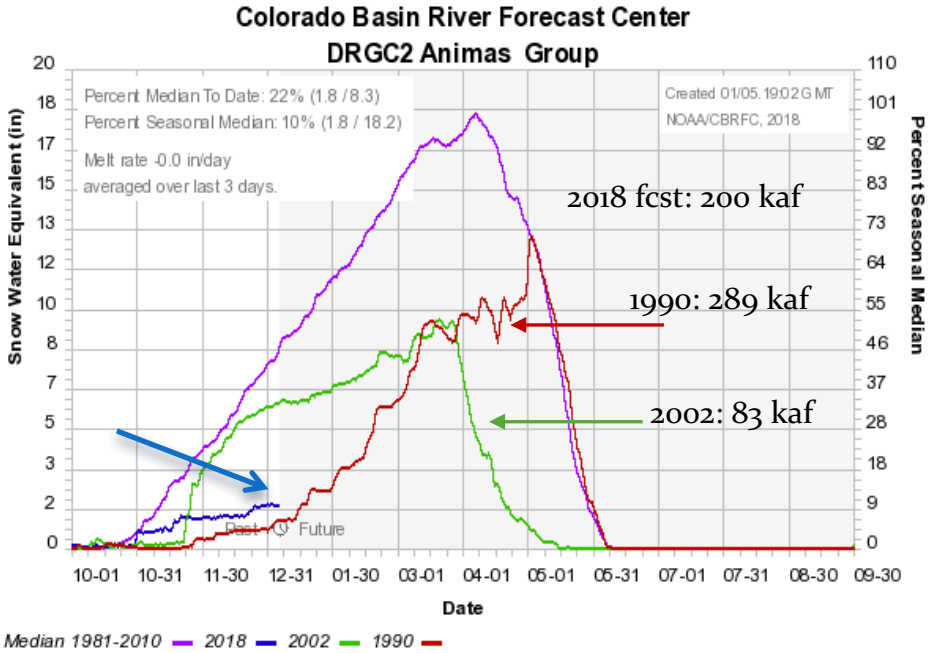



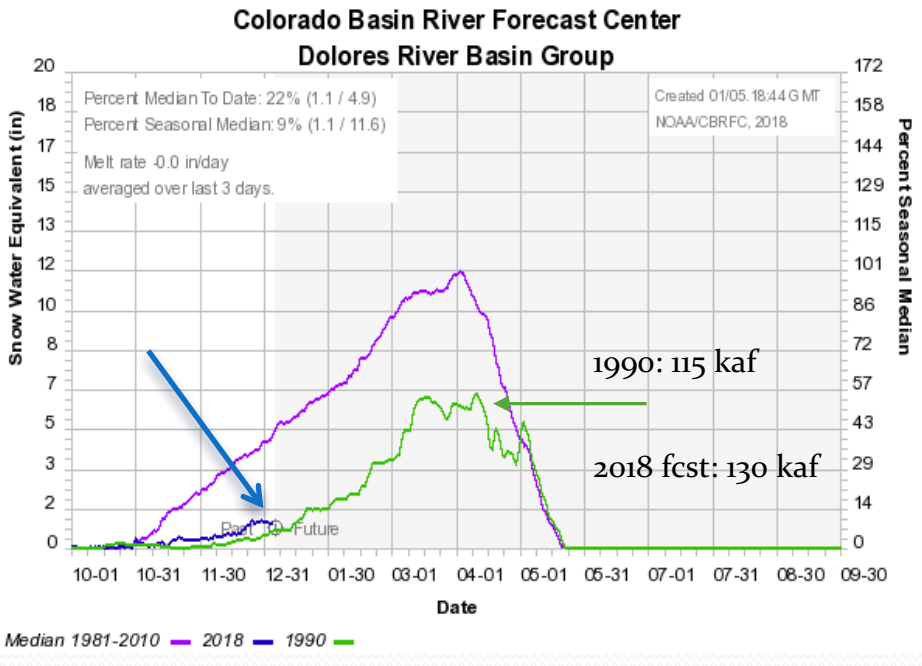



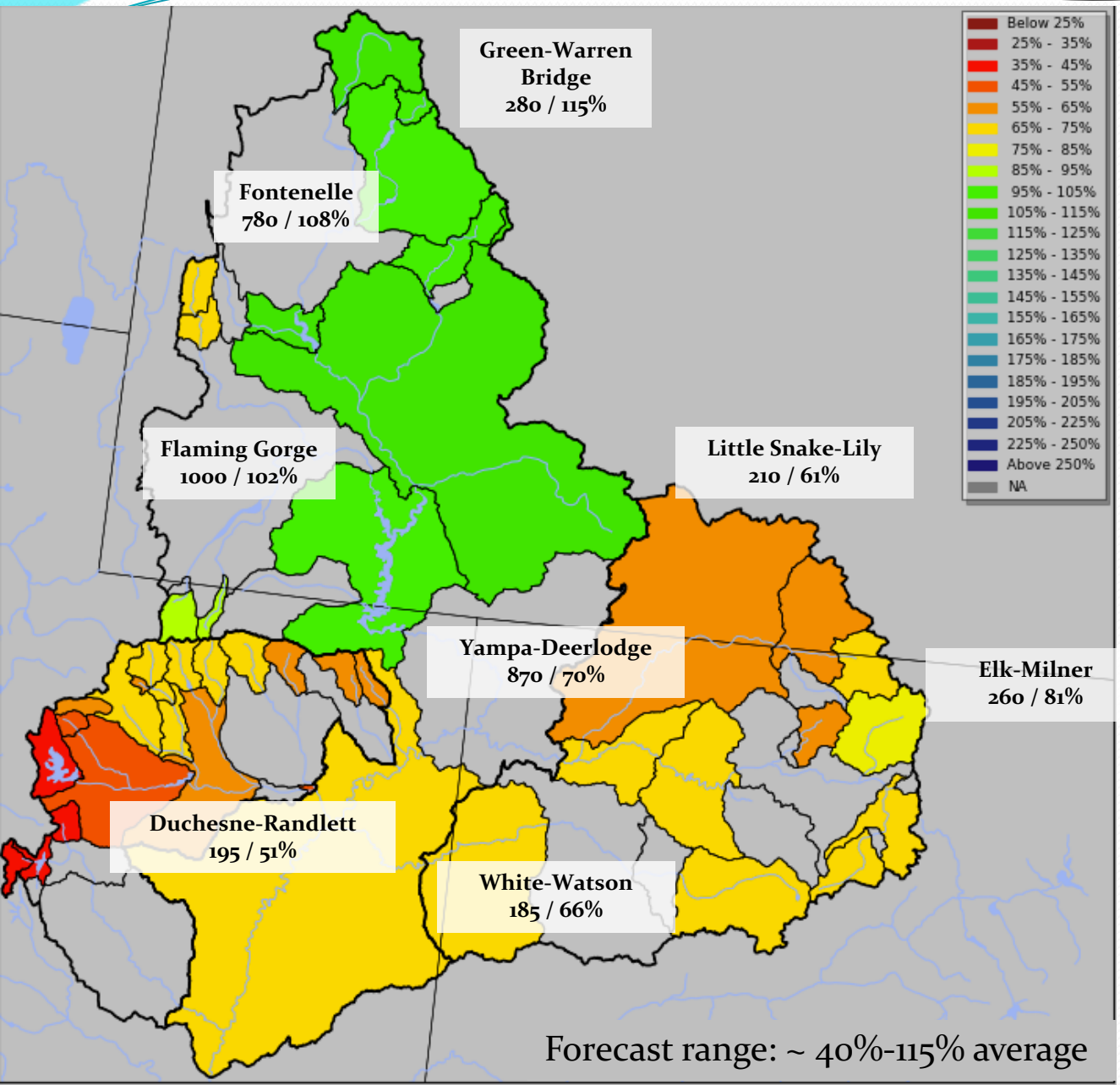
# Snow Conditions: SNOTEL Groups



# Upper Colorado: Green-Yampa-White-Duchesne

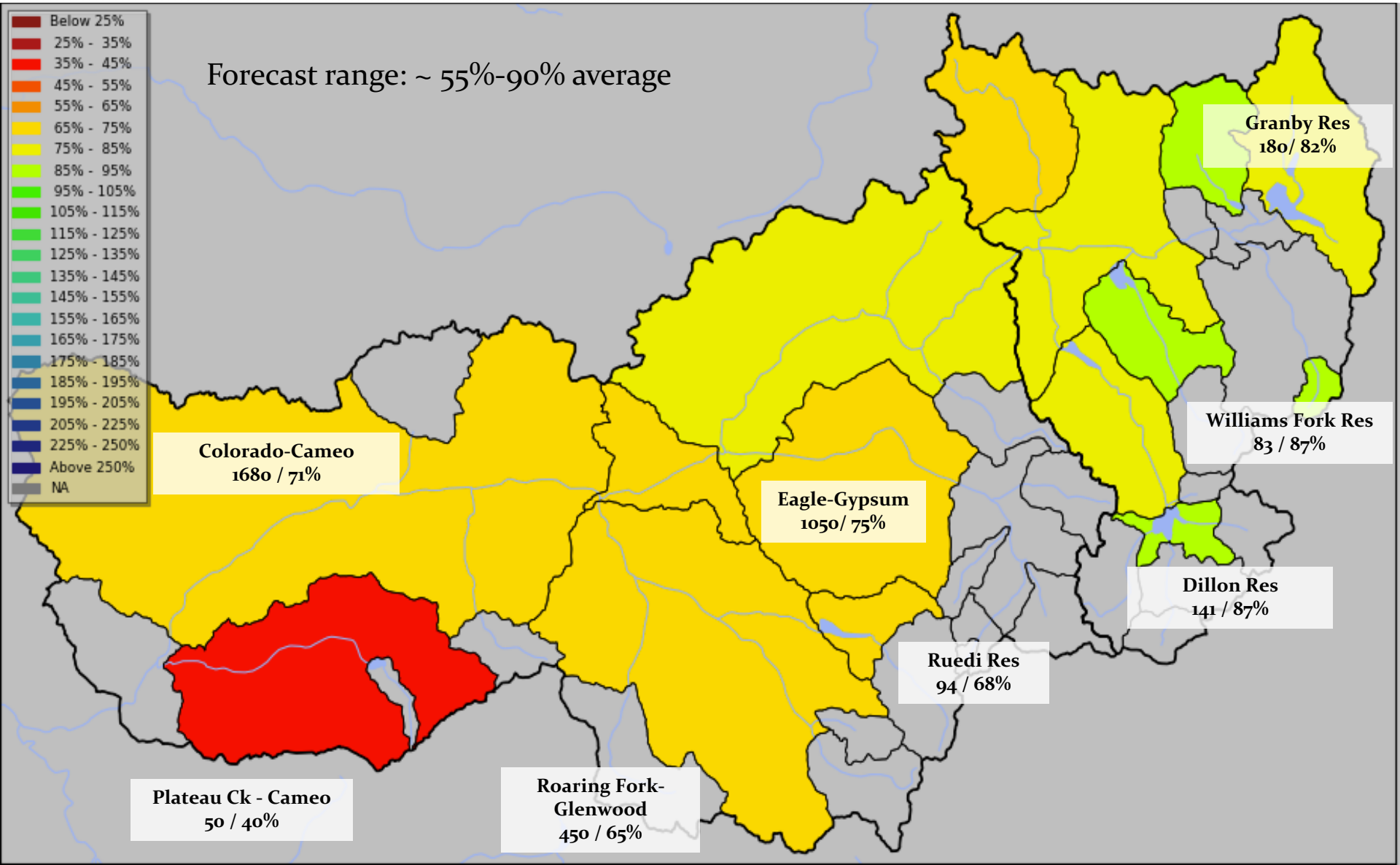



Forecasts as of Jan 1 2018

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

# Upper Colorado: Colorado River Mainstem

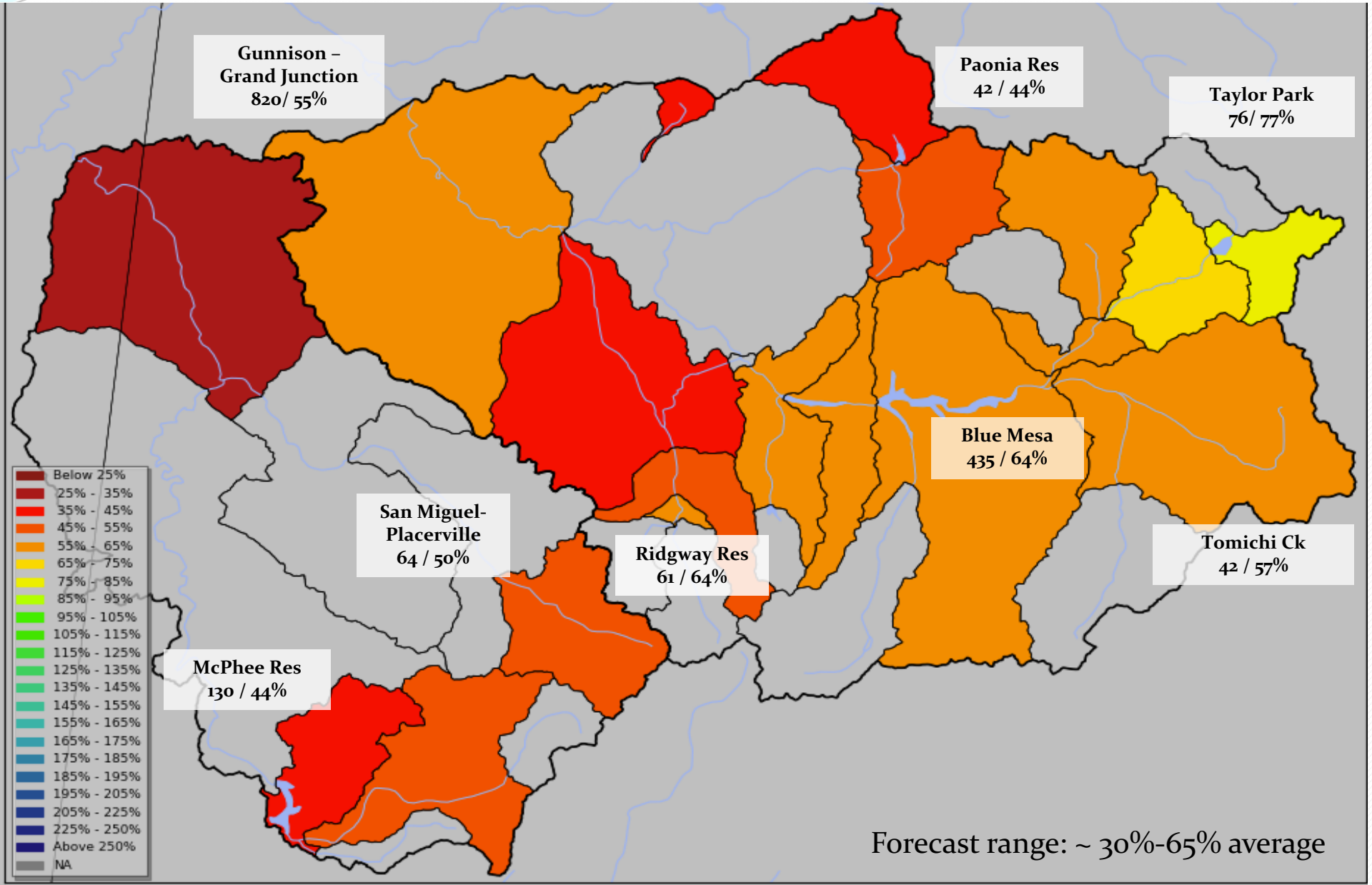
Forecasts as of Jan 1 2018
Volume in 1000's acre-feet / % of 1981-2010 average



# Upper Colorado: Gunnison and Dolores Basins

Forecasts as of Jan 1 2018

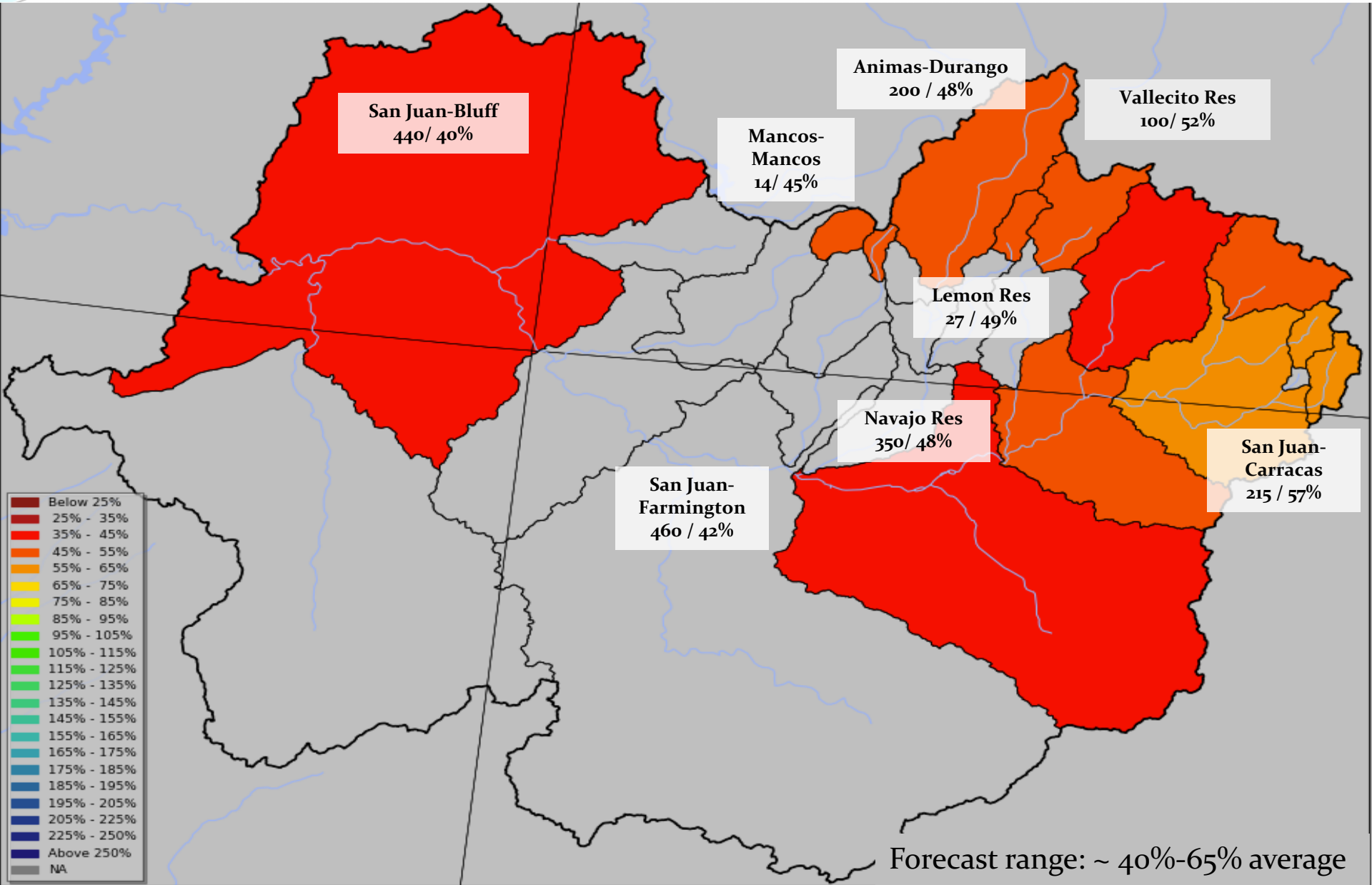
Volume in 1000's acre-feet / % of 1981-2010 average



# Upper Colorado: San Juan Basin

Forecasts as of Jan 1 2018

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



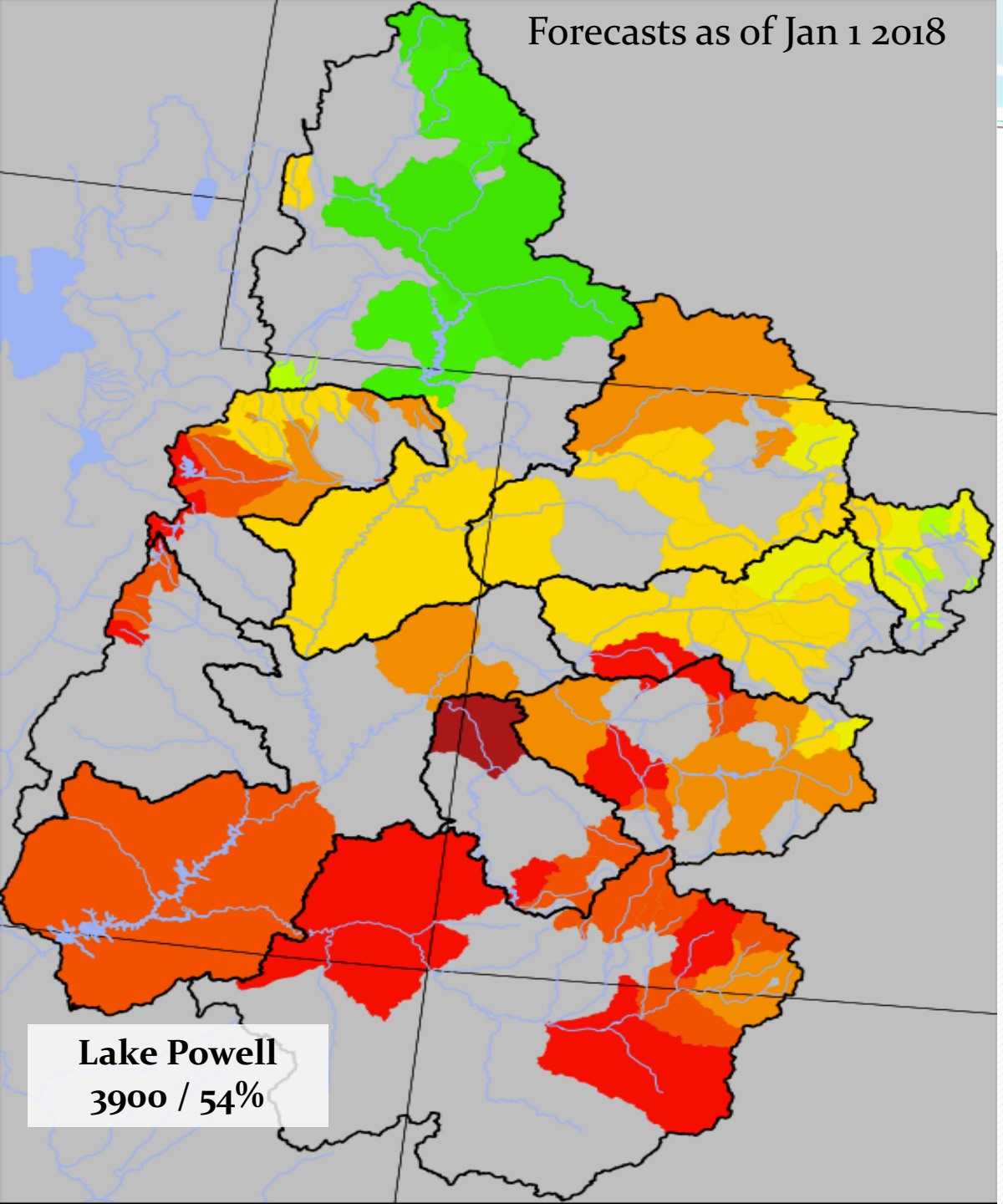

Forecast range: ~ 40%-65% average

# Upper Colorado April-July Streamflow Volume Forecasts

(% of 1981-2010 average)

Forecasts as of Jan 1 2018

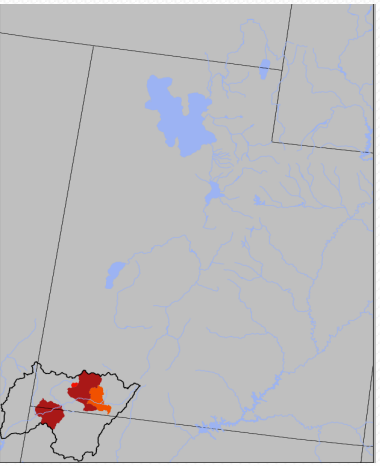
Lake Powell:
3900 kaf / 55 % average

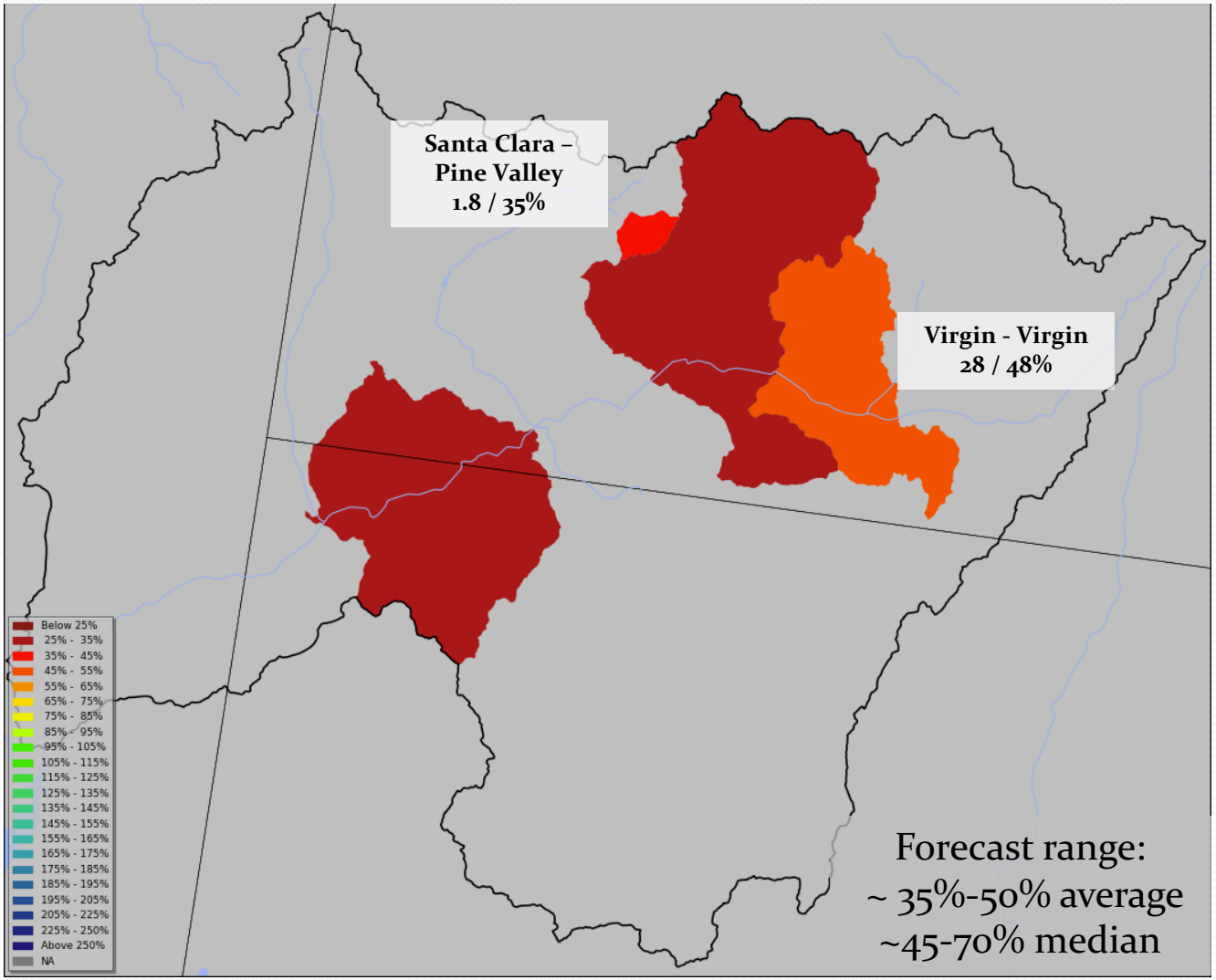



- Below 25%
- 25% - 35%
- 35% - 45%
- 45% - 55%
- 55% - 65%
- 65% - 75%
- 75% - 85%
- 85% - 95%
- 95% - 105%
- 105% - 115%
- 115% - 125%
- 125% - 135%
- 135% - 145%
- 145% - 155%
- 155% - 165%
- 165% - 175%
- 175% - 185%
- 185% - 195%
- 195% - 205%
- 205% - 225%
- 225% - 250%
- Above 250%
- NA

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

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

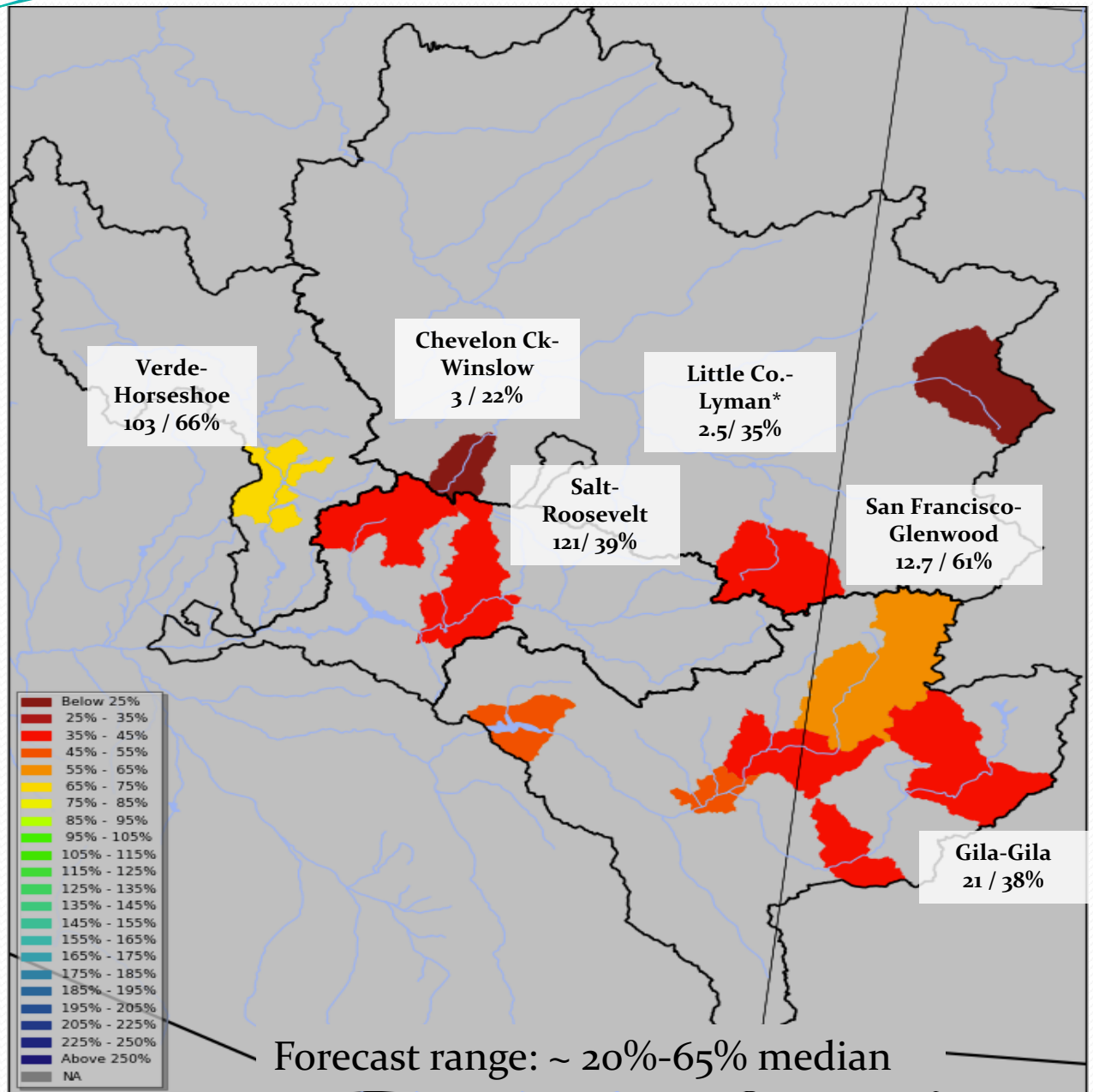


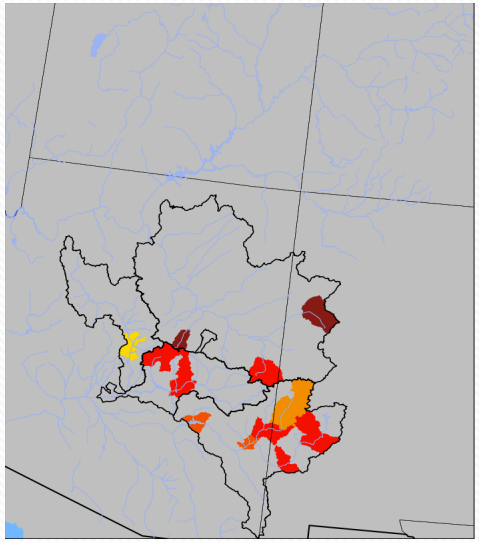



Forecasts as of Jan 1 2018

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

Forecasts as of Jan 1 2018

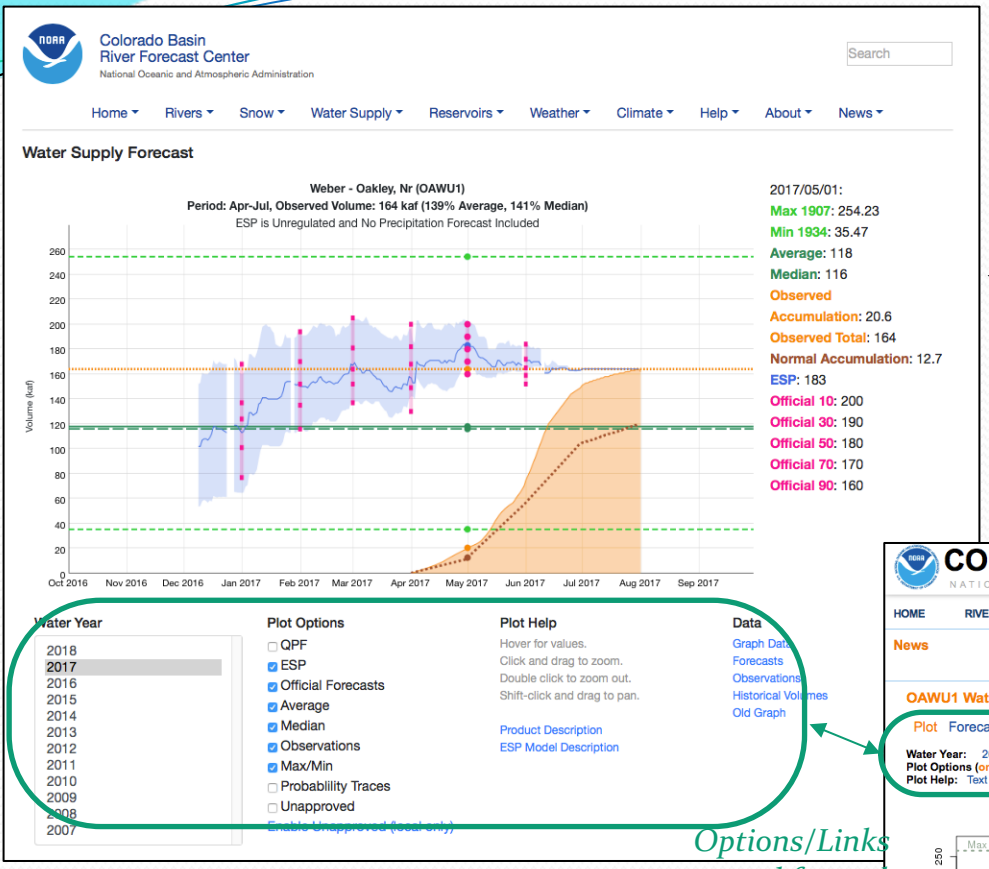


Forecast range: ~ 20%-65% median

* Jan-June forecast period

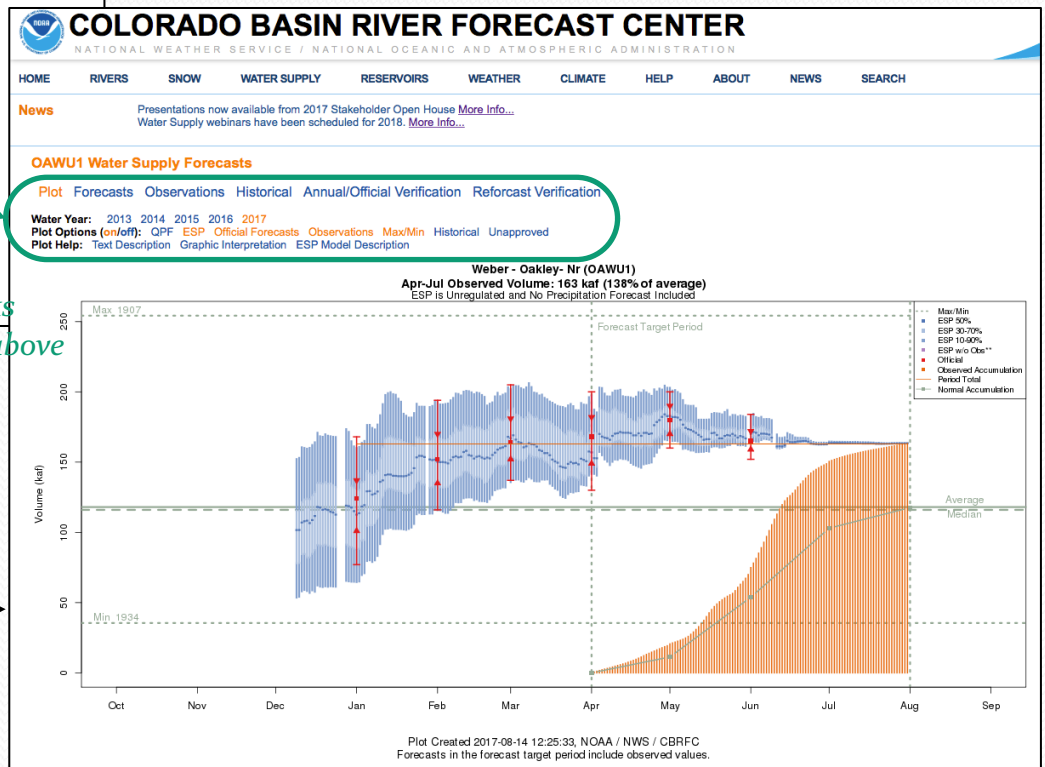
# Updated Forecast Evolution Plots – Similar Look, New Features




New:

- Dynamic (built on the fly)
  - Updates immediately available
- Interactive
  - Hover for any day's values
  - Zoom ability
- Other
  - Does not have Raw Model (ESP) 30%/70% on this plot
    - Use Probability Traces plot
  - Forecast Target Period not delineated
    - Use Normal Accumulation line

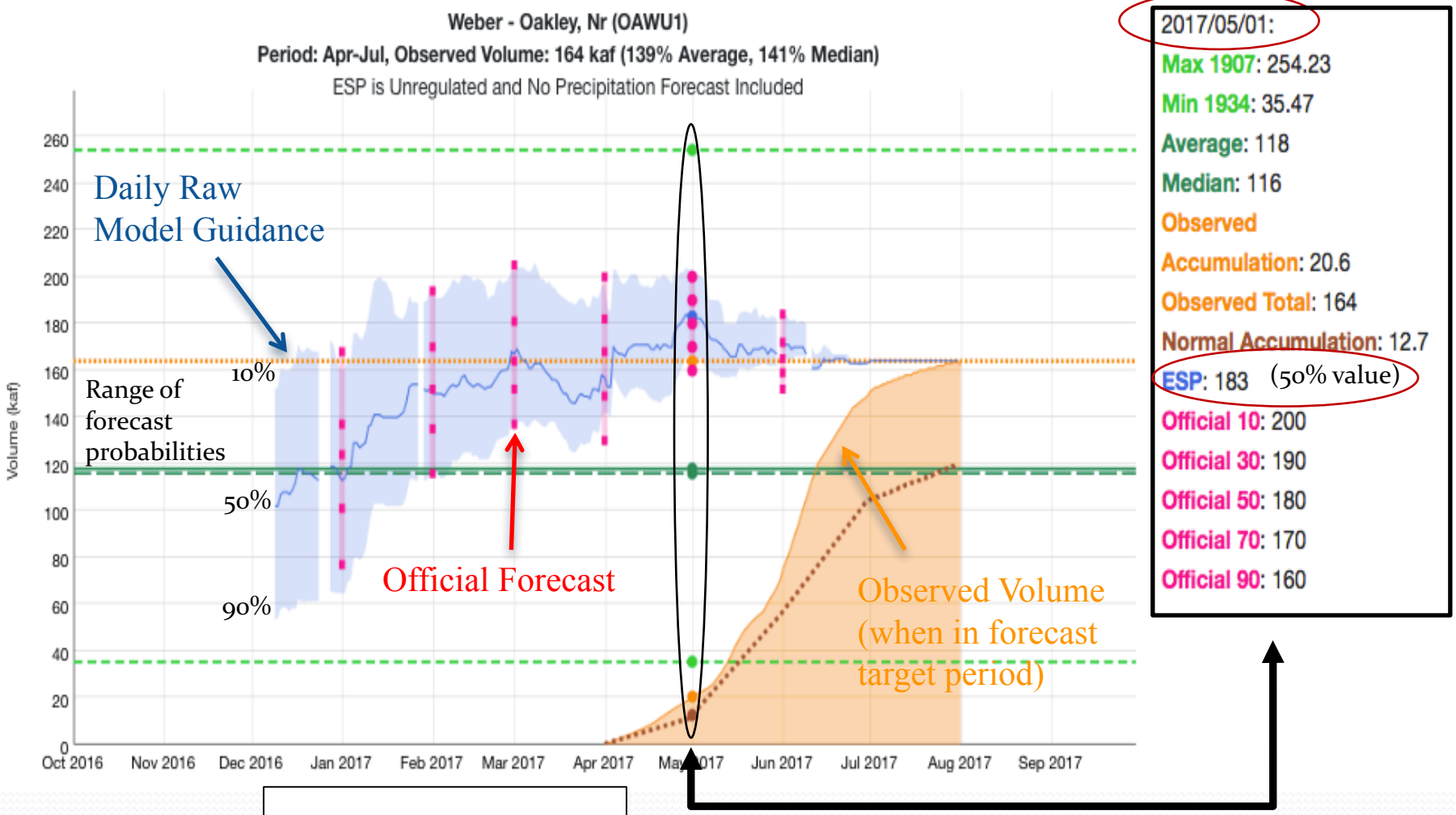
*Options/Links moved from above to below plot*




Old:

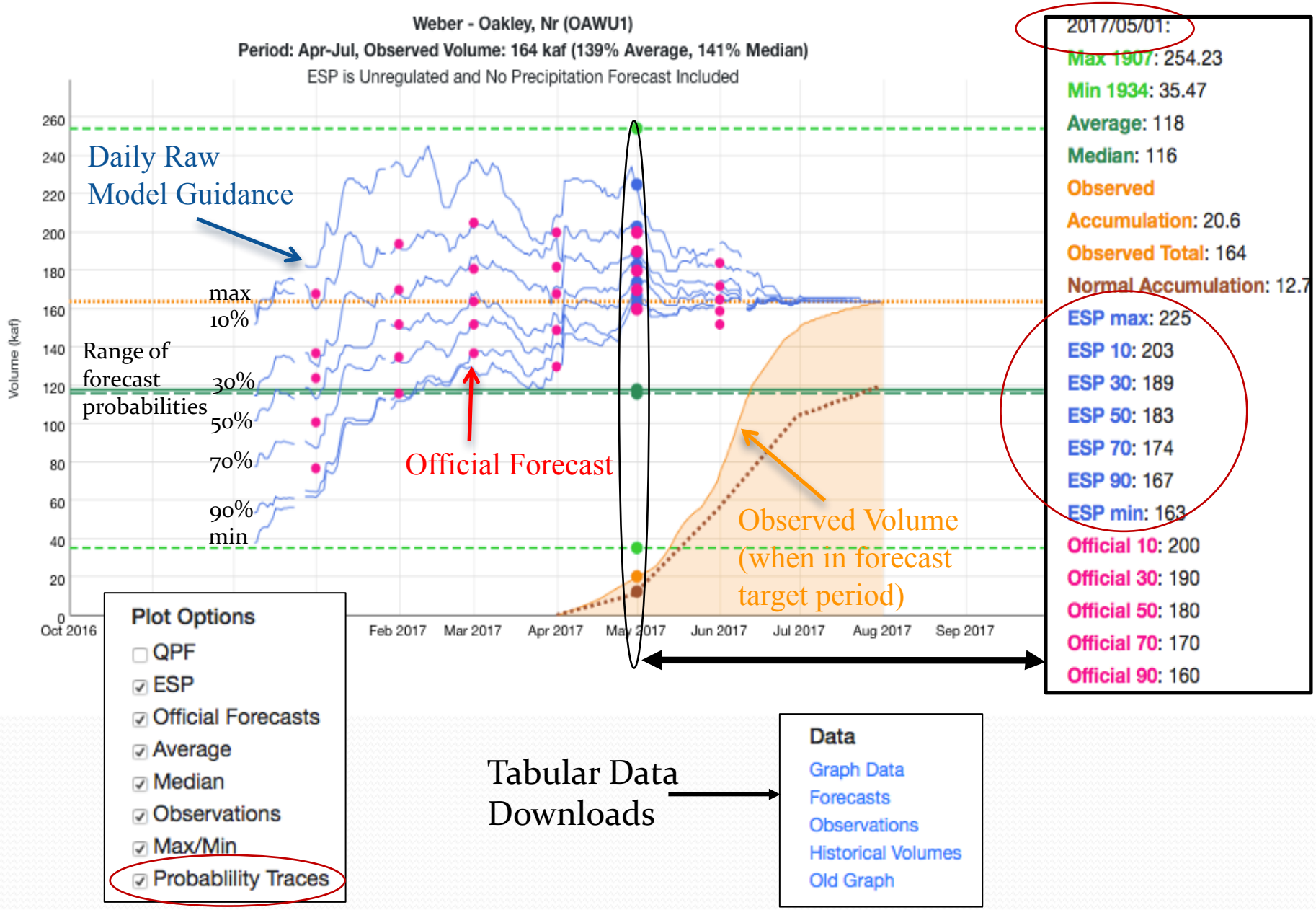
- Static (pre-built images)
  - Updates only available after slow manual process
- Not interactive
  - Only latest values easily accessible

# Updated Forecast Evolution Plots – Default Plot



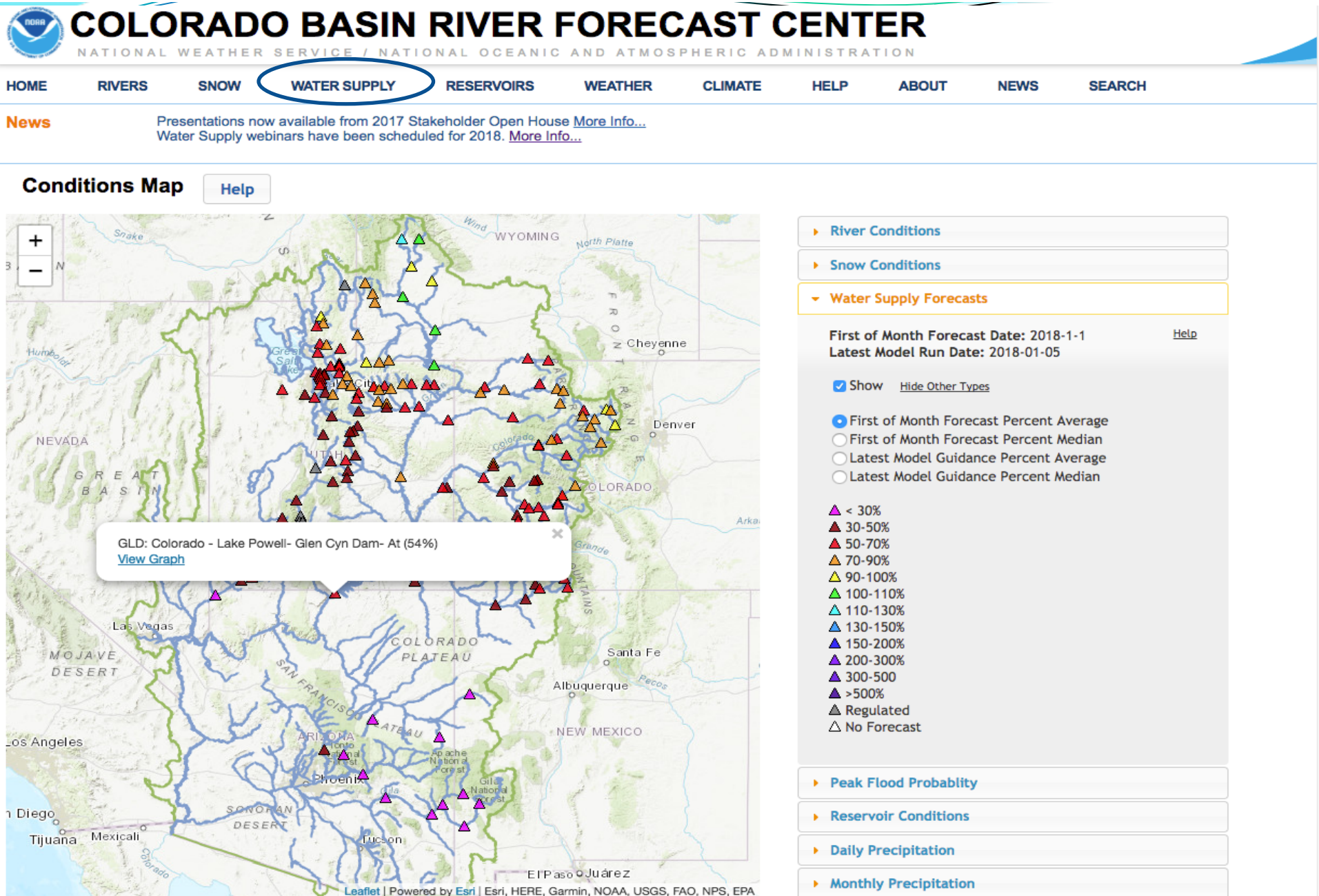

**HOVER:** A dot on the plot (cursor location) corresponds to a value in the list

# Updated Forecast Evolution Plots – Probability Traces



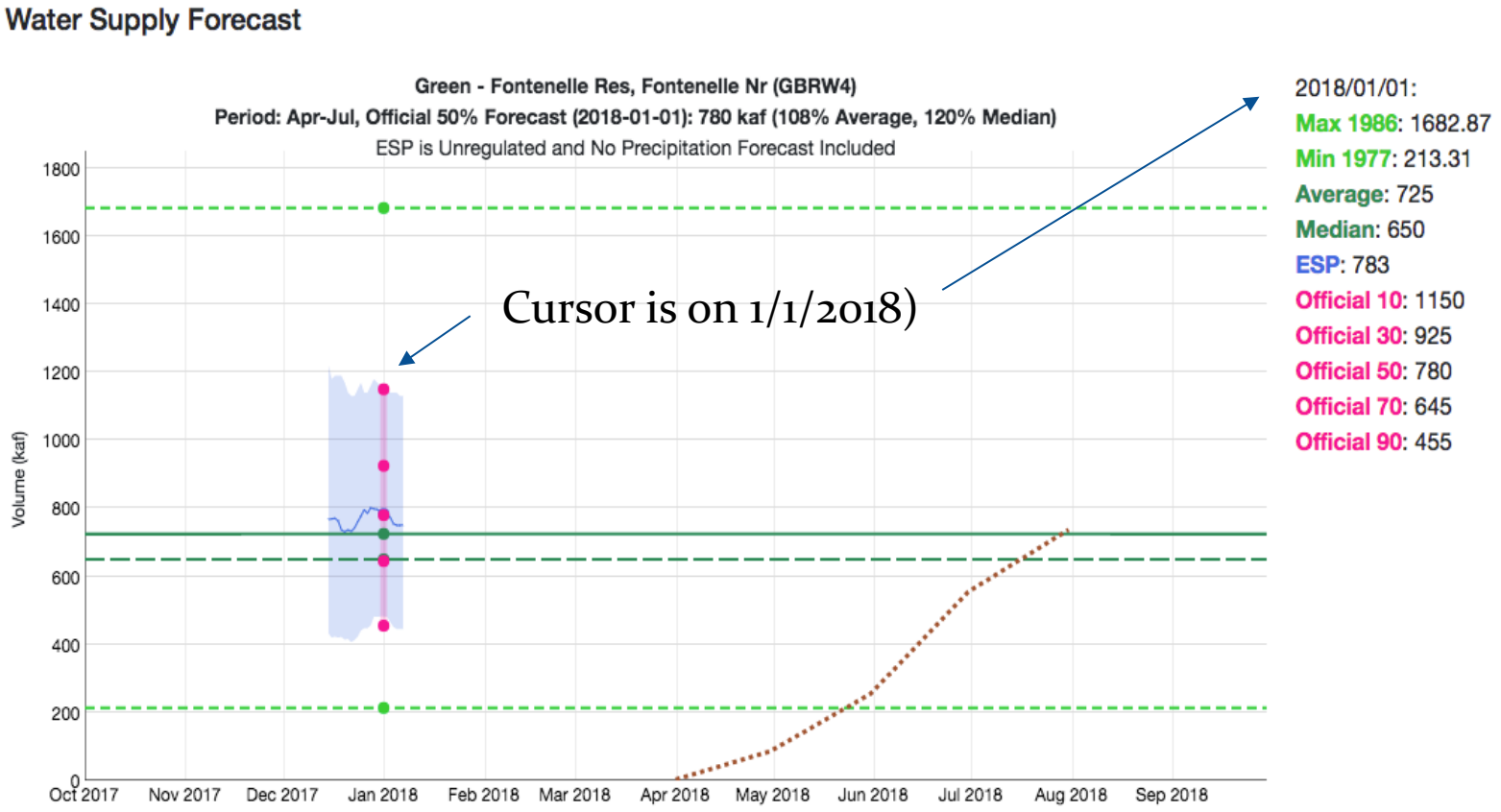
# Forecast Evolution Plot – Where do you find them?

**CBRFC Web Page: www.cbrfc.noaa.gov**



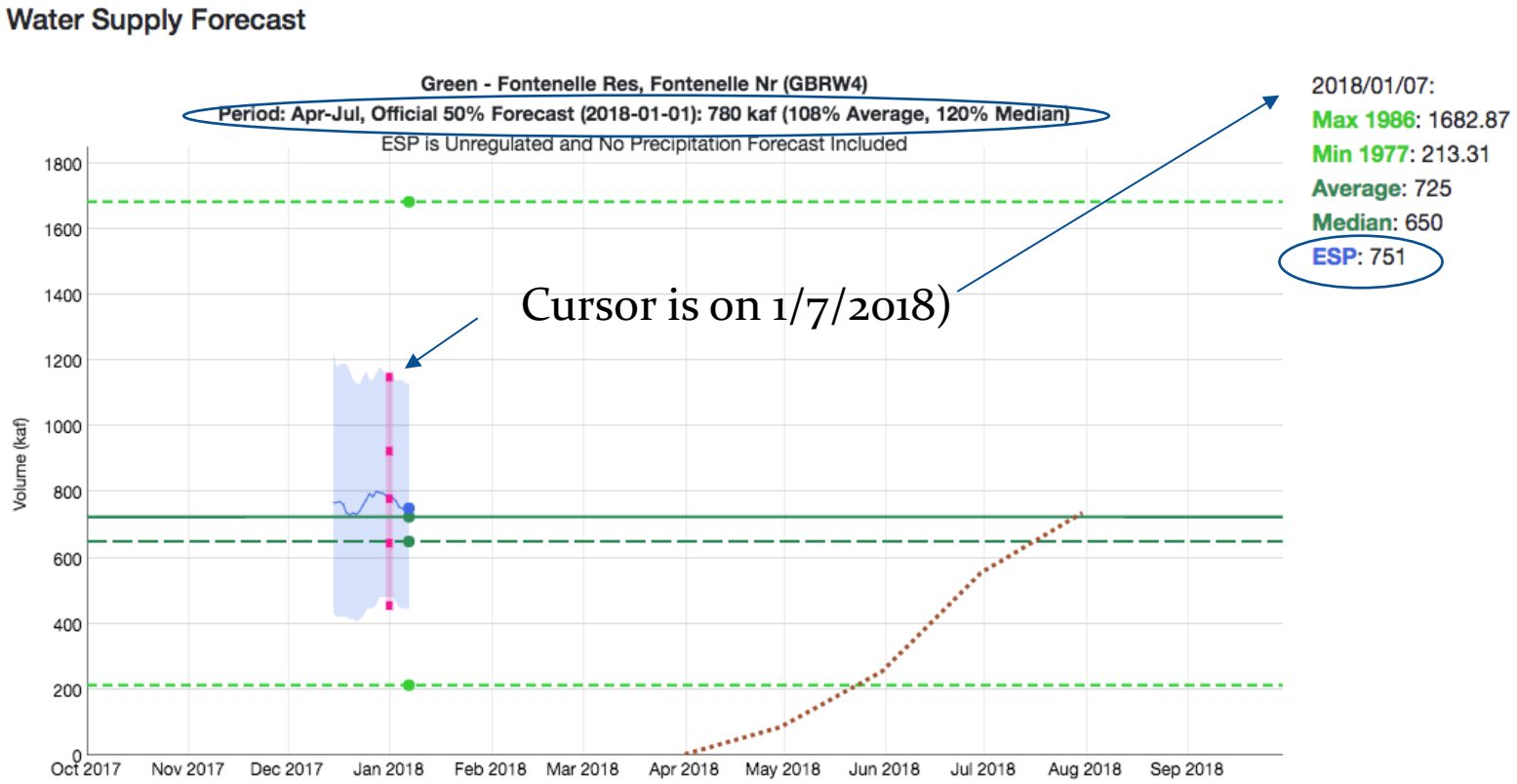
# Forecast Evolution Plot

## Fontenelle Reservoir Inflow
Forecast: 108 % of average



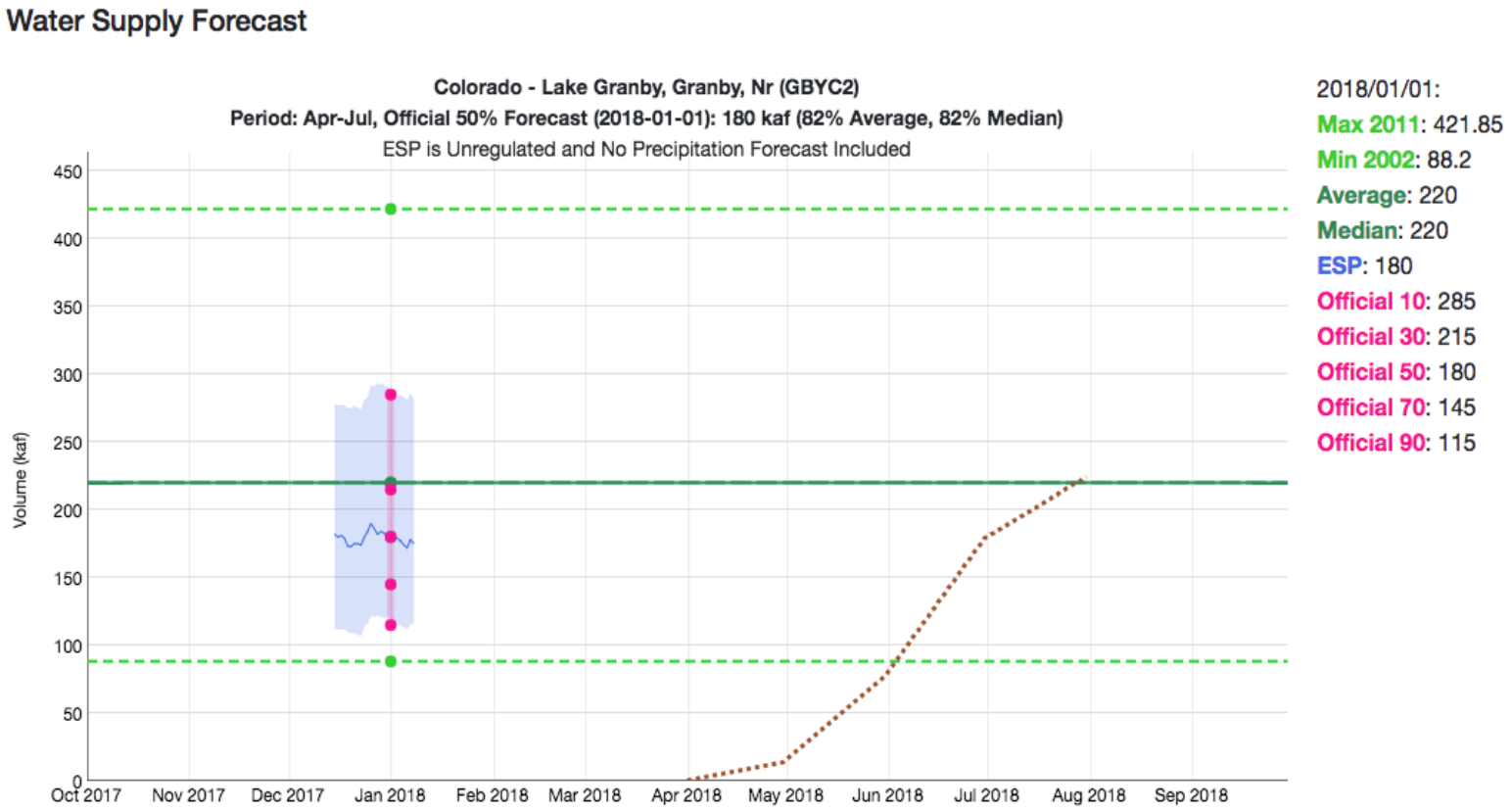
# Forecast Evolution Plot

## Fontenelle Reservoir Inflow
Forecast: 108 % of average



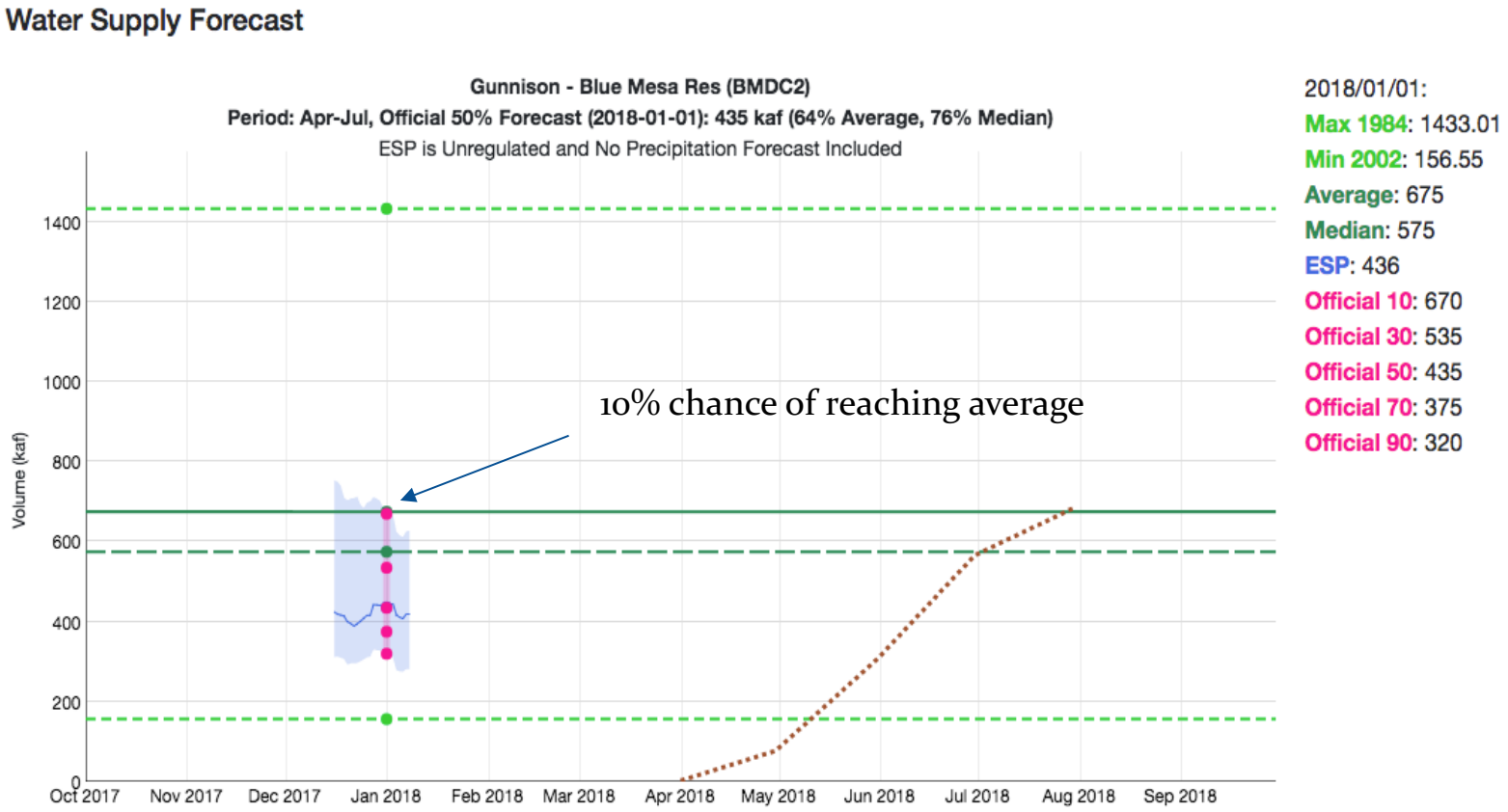
# Forecast Evolution Plot

## Lake Granby Inflow
Forecast 82% of average



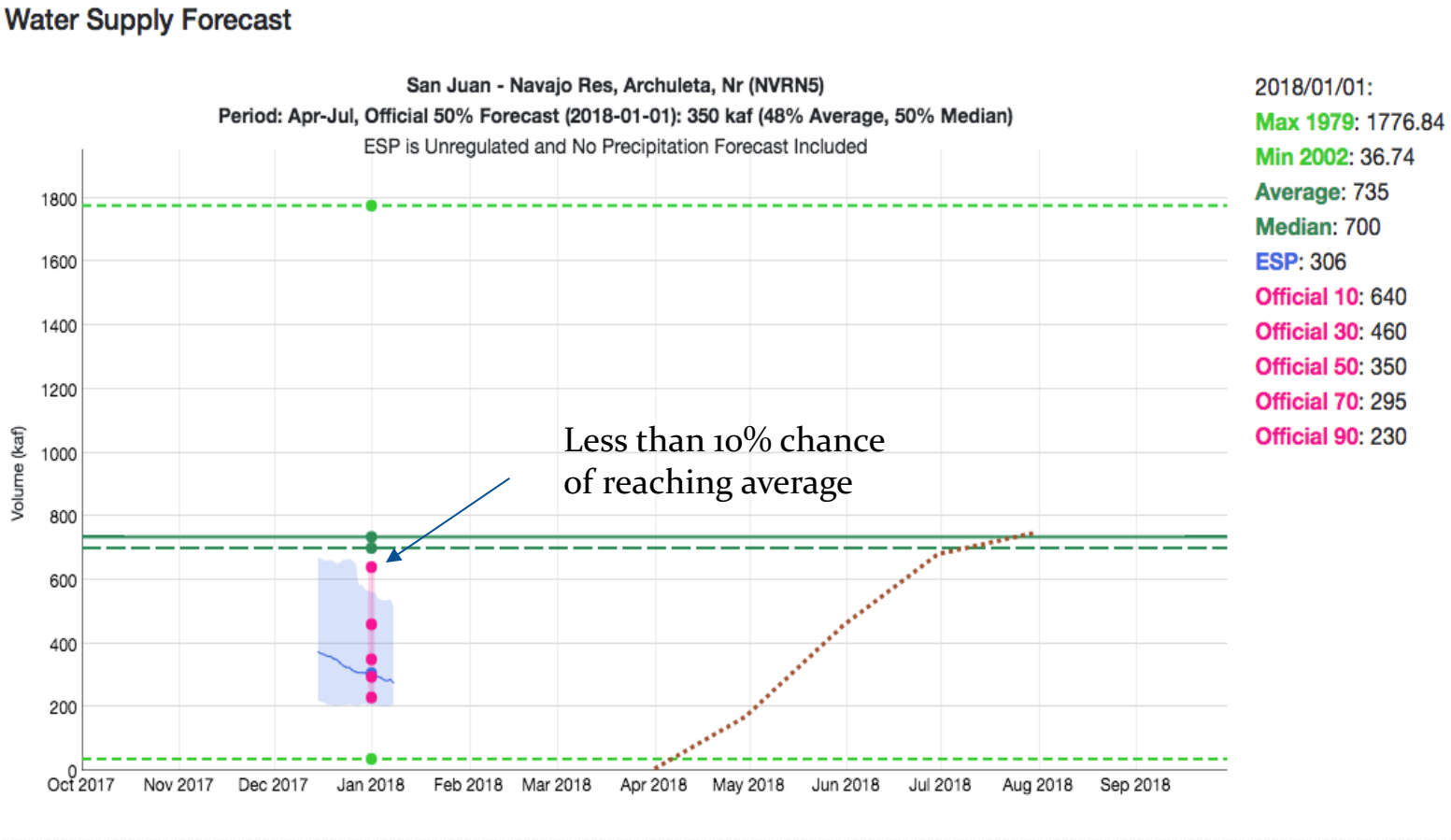
# Forecast Evolution Plot

## Blue Mesa Reservoir Inflow
Forecast 64% of average



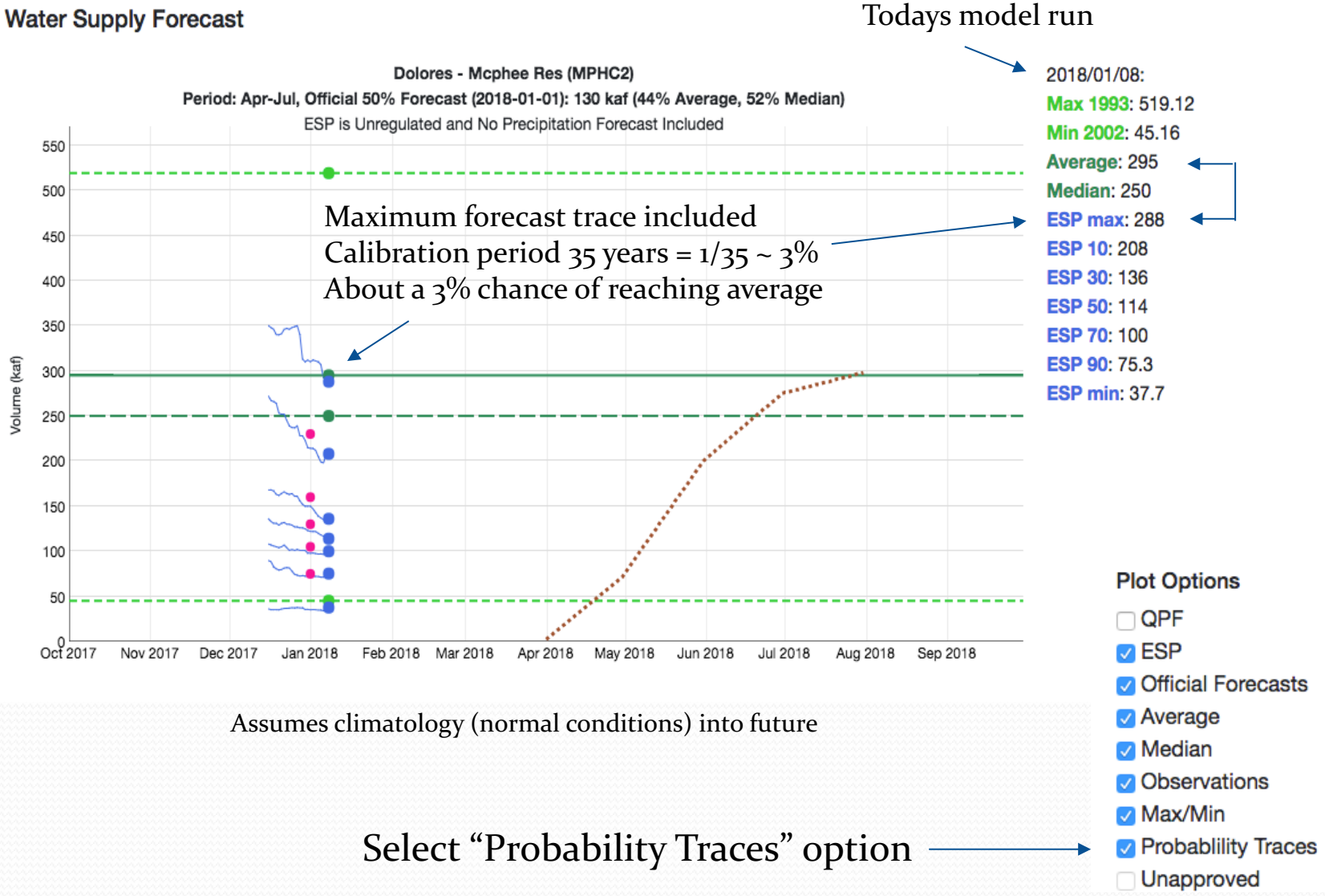
# Forecast Evolution Plot

## Navajo Reservoir Inflow
Forecast 48% of average



# Forecast Evolution Plot

## Mcphee Reservoir Inflow
Forecast 44% of average

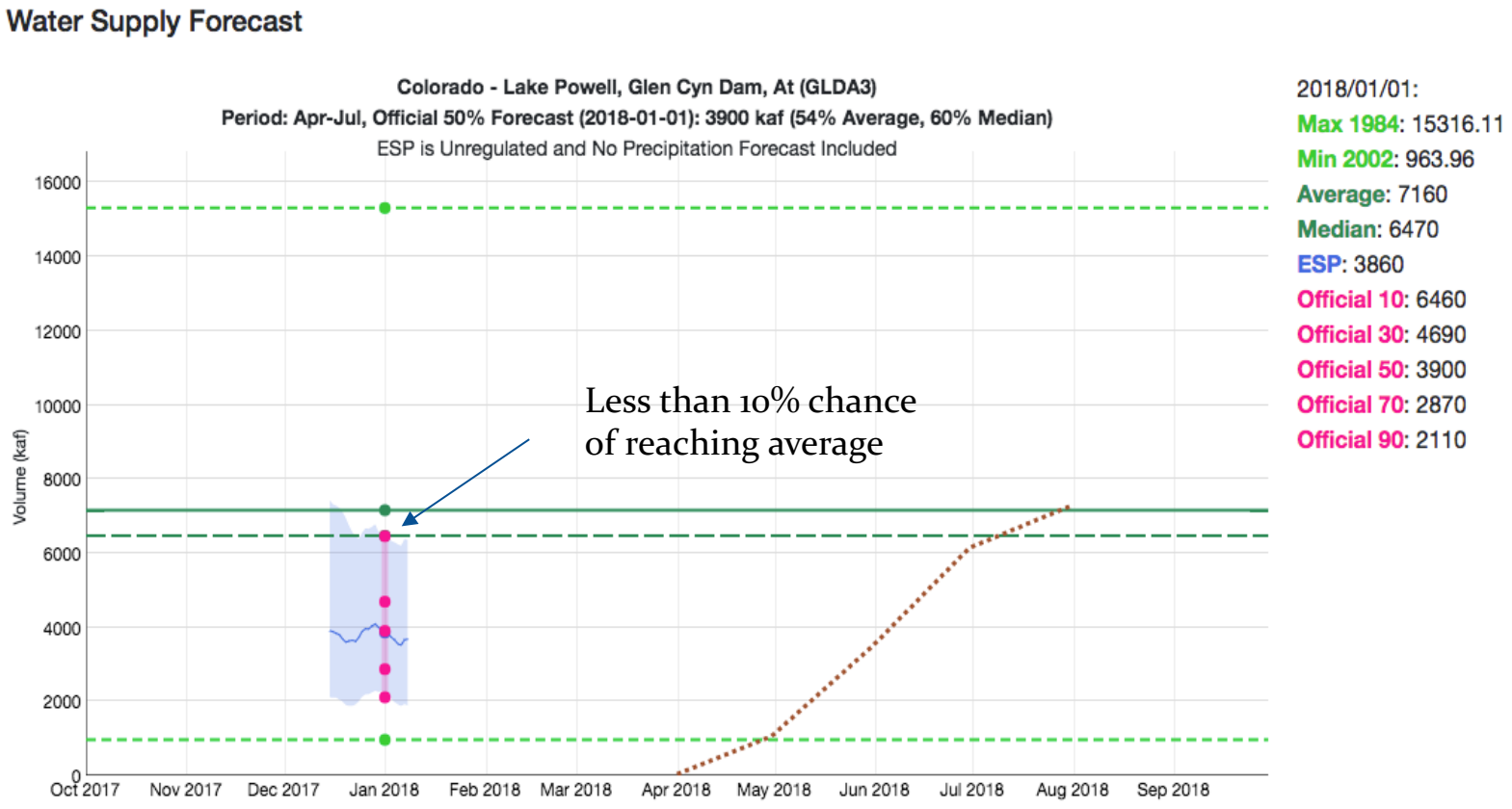



Assumes climatology (normal conditions) into future

Select “Probability Traces” option →

# Forecast Evolution Plot

## Lake Powell Inflow
Forecast 54% of average



# Forecast Validation: How good are forecasts in January ?

## Historical Model Error
## 1981-2010

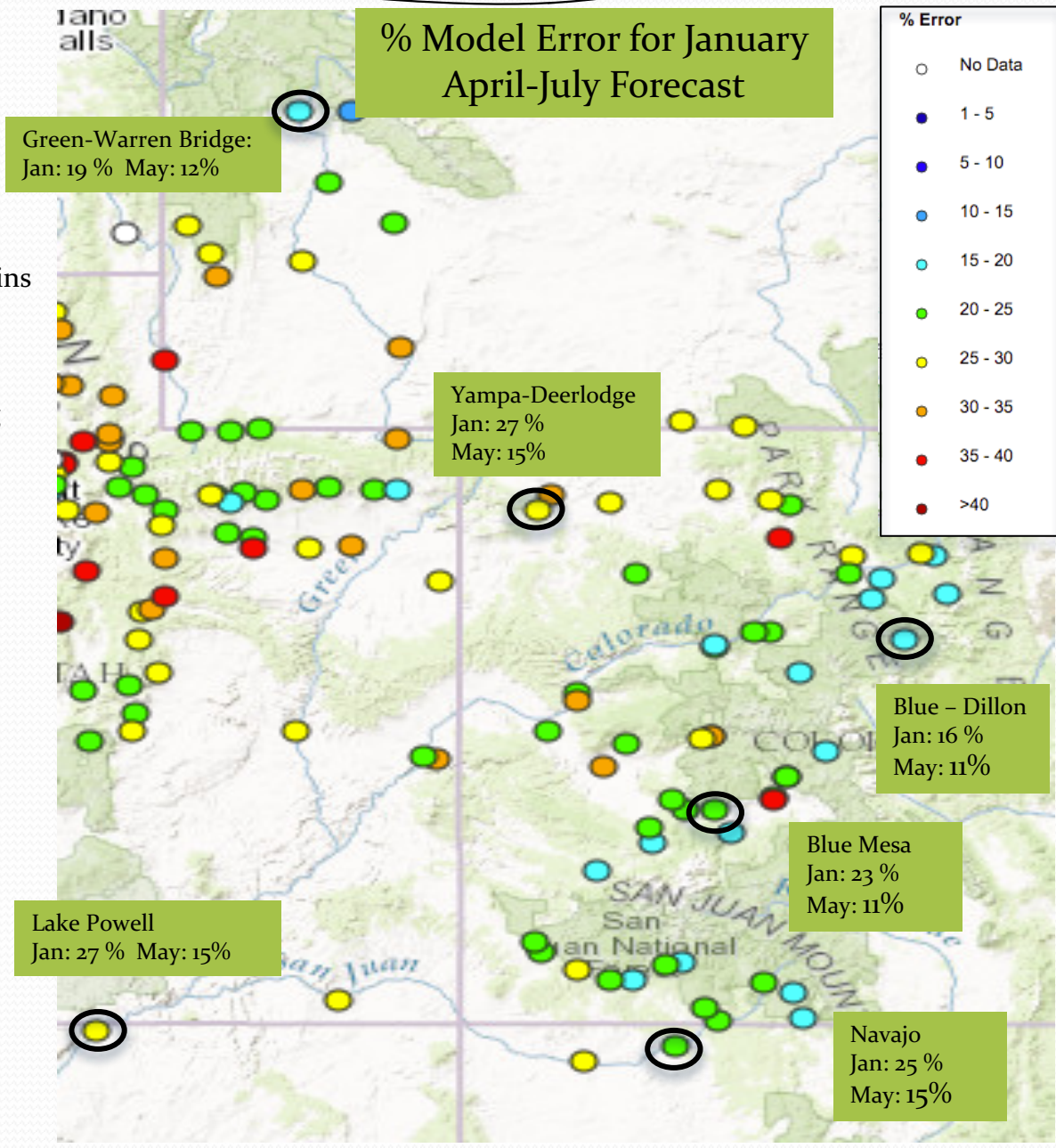
January has has the highest model/forecast errors
significant snow accumulation period remains

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

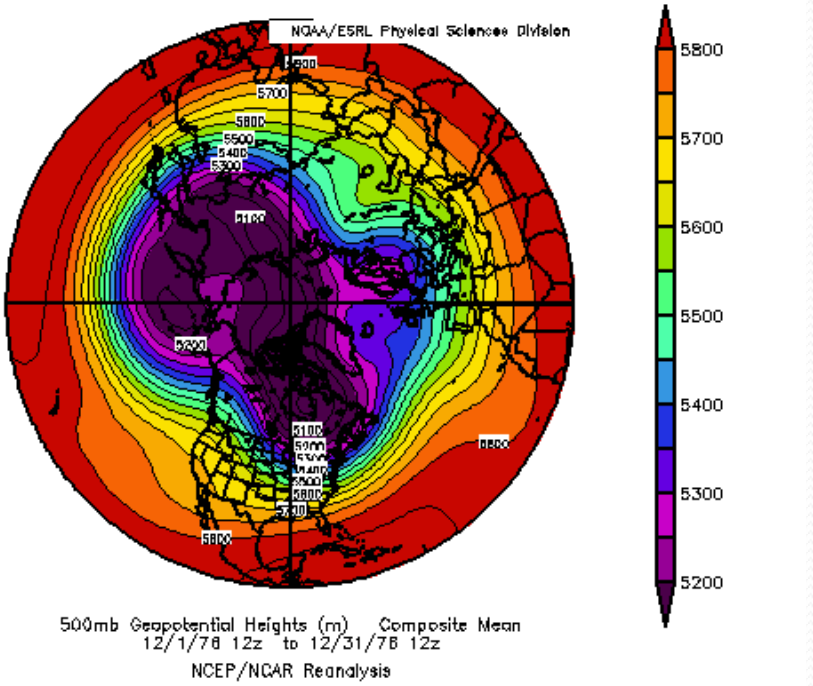
Where We Do Worse:
- Lower elevations (rain or early melt)
- Downstream of diversions / irrigation
- Little is known about diversions / demands



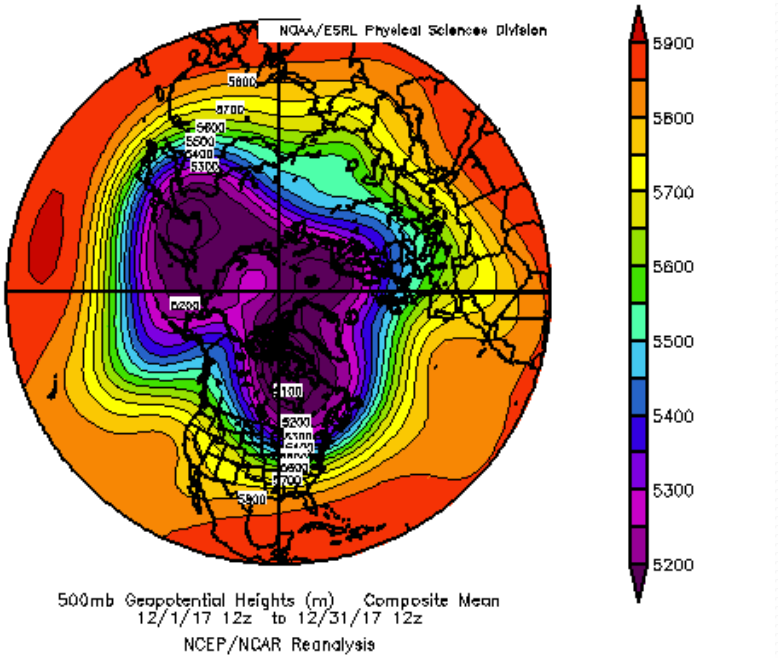
# Future Weather

Lowest snowpack since ???

Atmospheric Pattern
December 1976




Atmospheric Pattern
December 2017

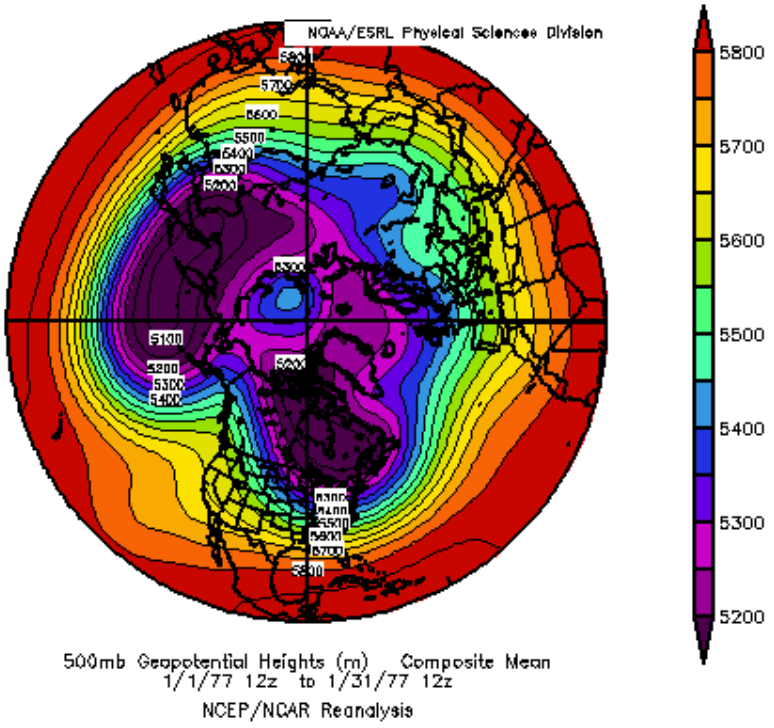



Similarities have been drawn between the 1976/77 winter and the 2017/18 winter.

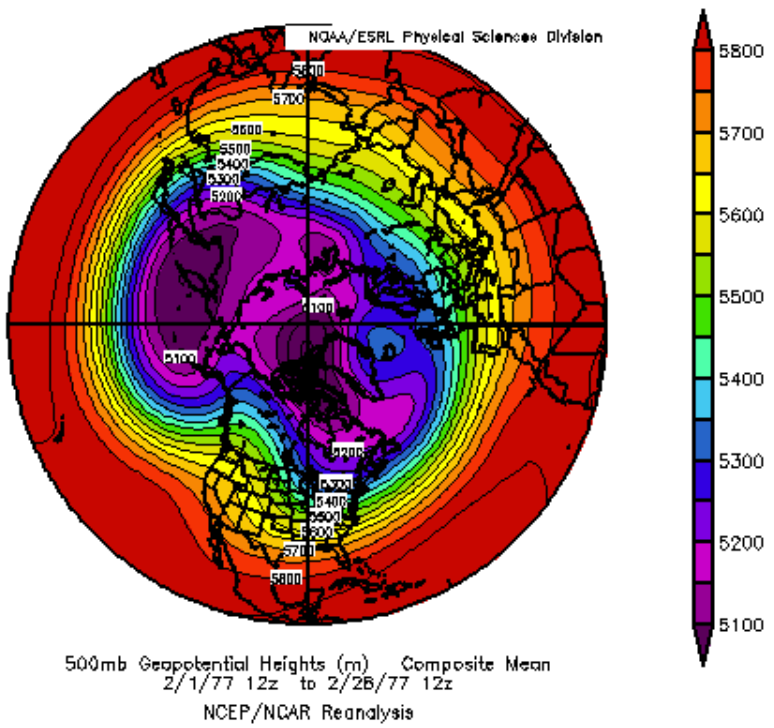
# Future Weather

What happened that winter/spring?

Atmospheric Pattern
January 1977




Atmospheric Pattern
February 1977

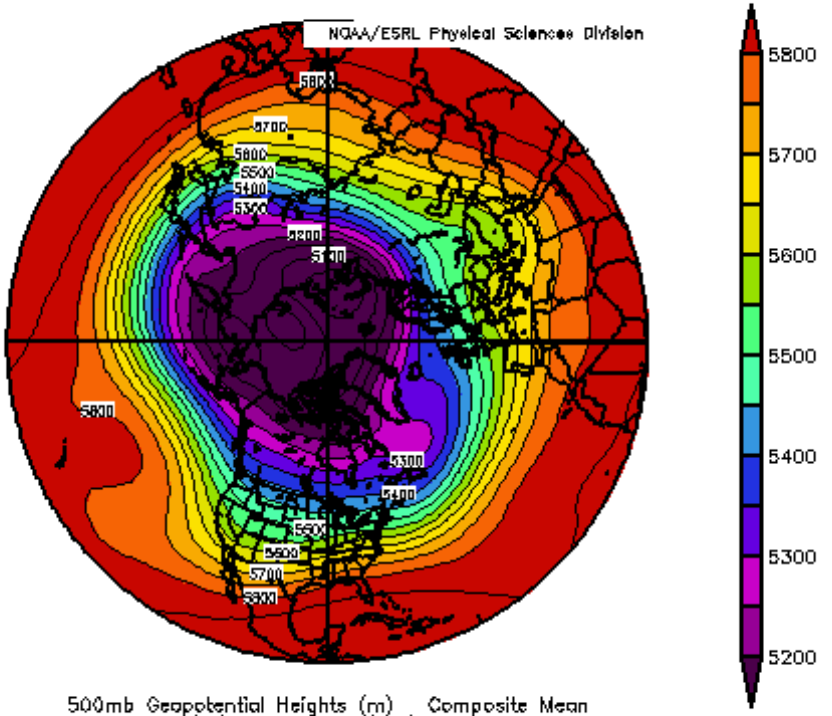


# Future Weather

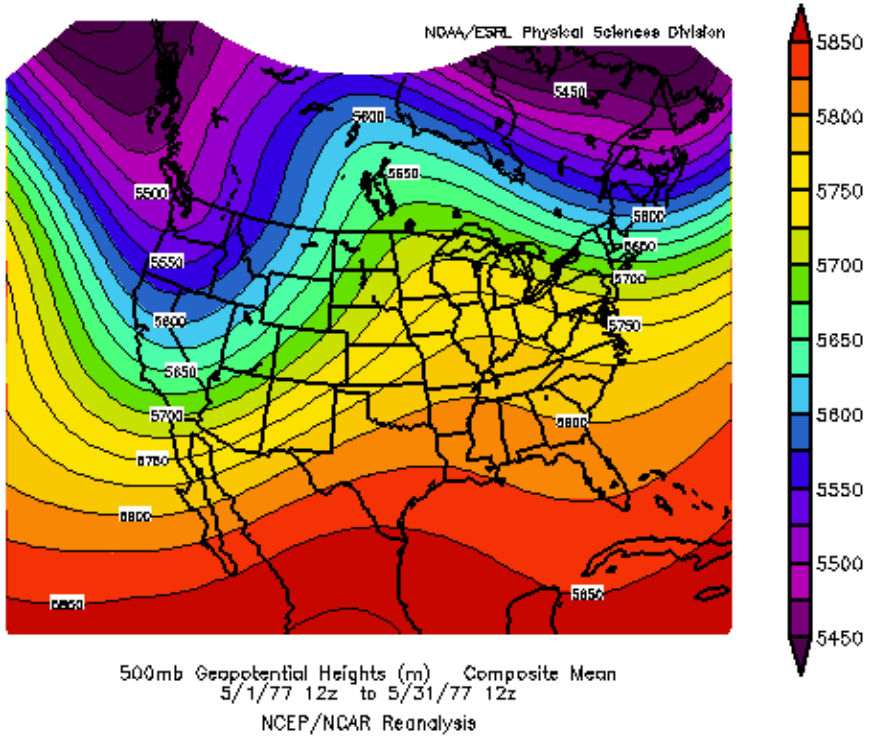
What happened that winter/spring?

The Pattern Did Break !

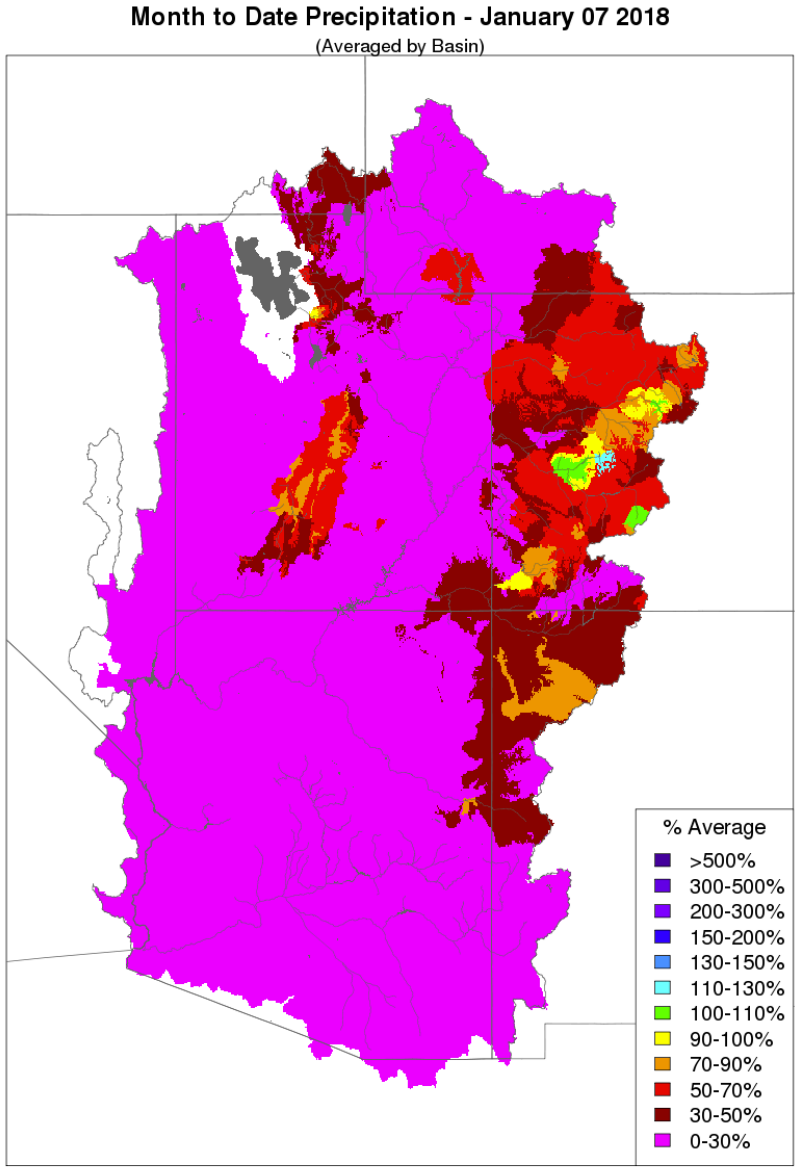
Atmospheric Pattern
March 1977

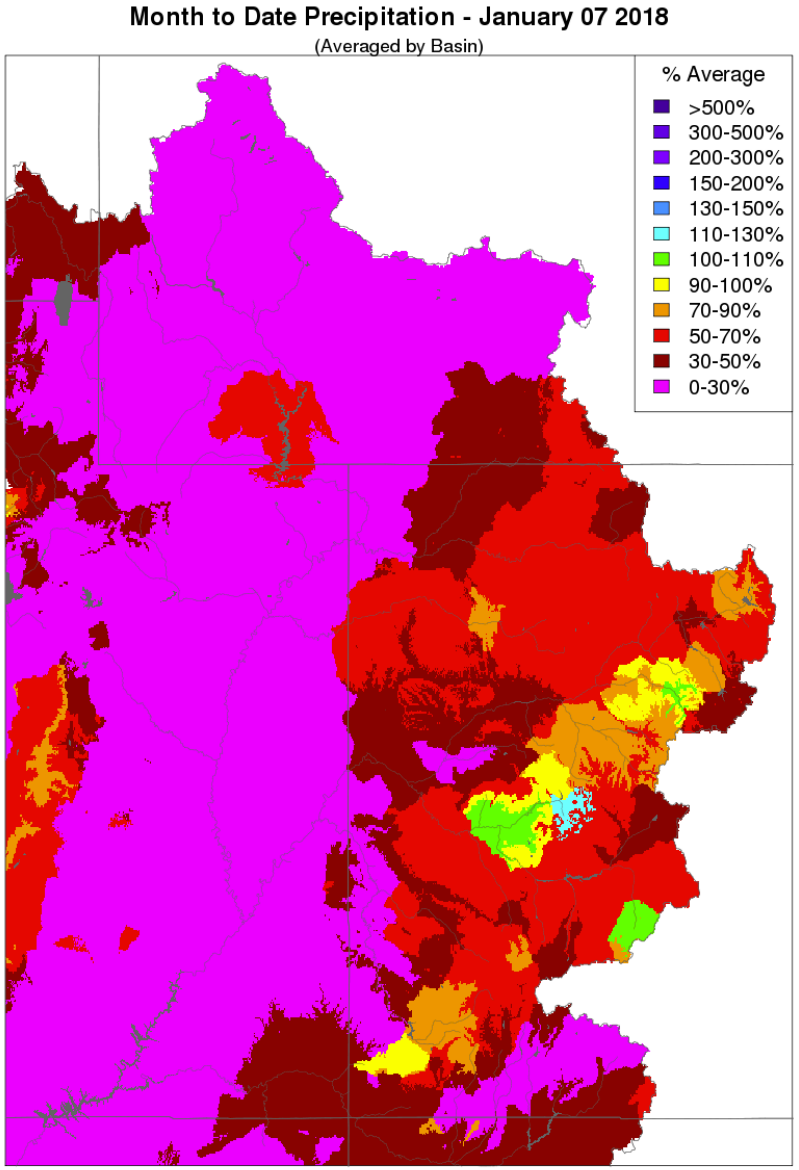



Above average precipitation in March

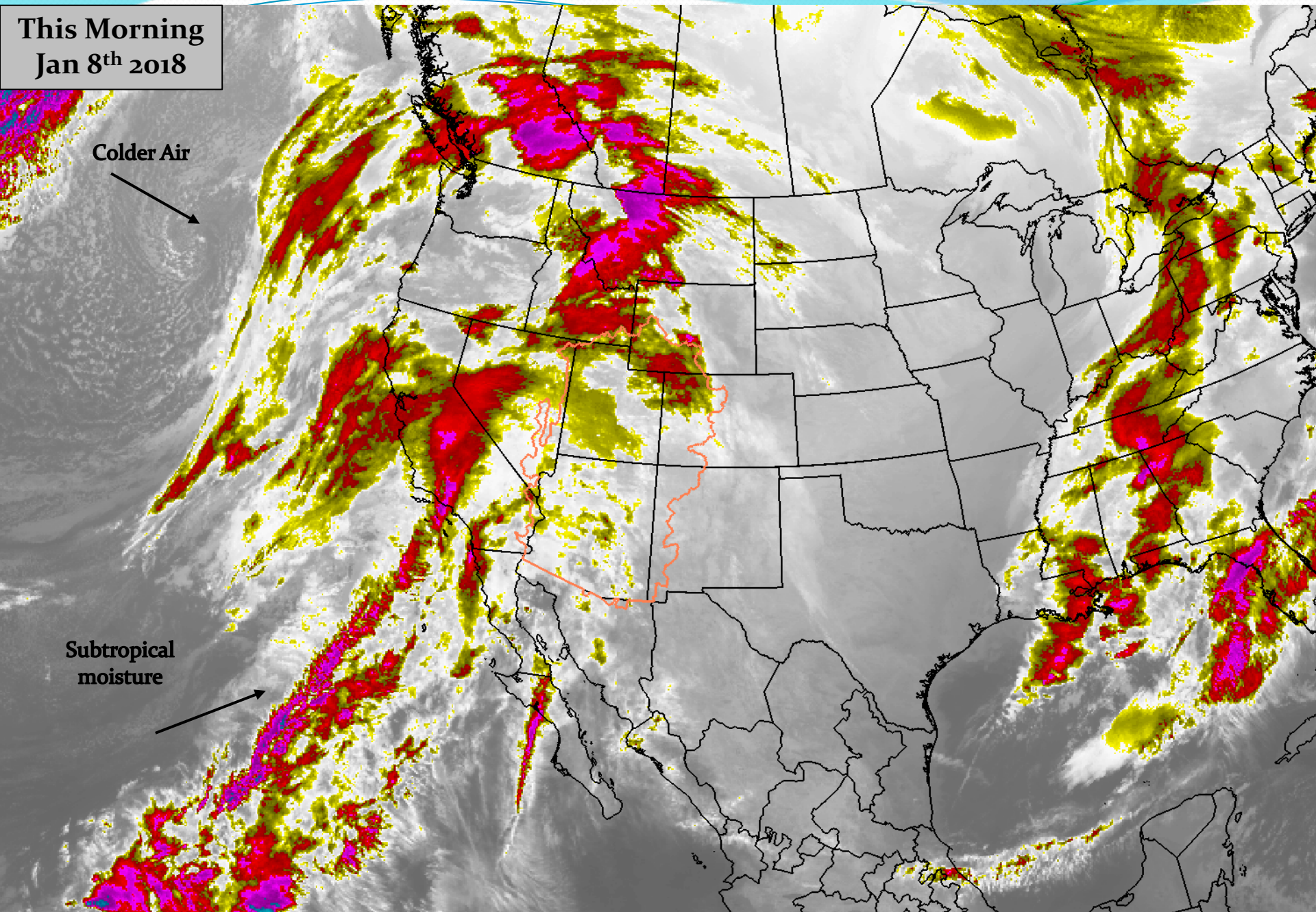


# January Precipitation
# (first 7 days)

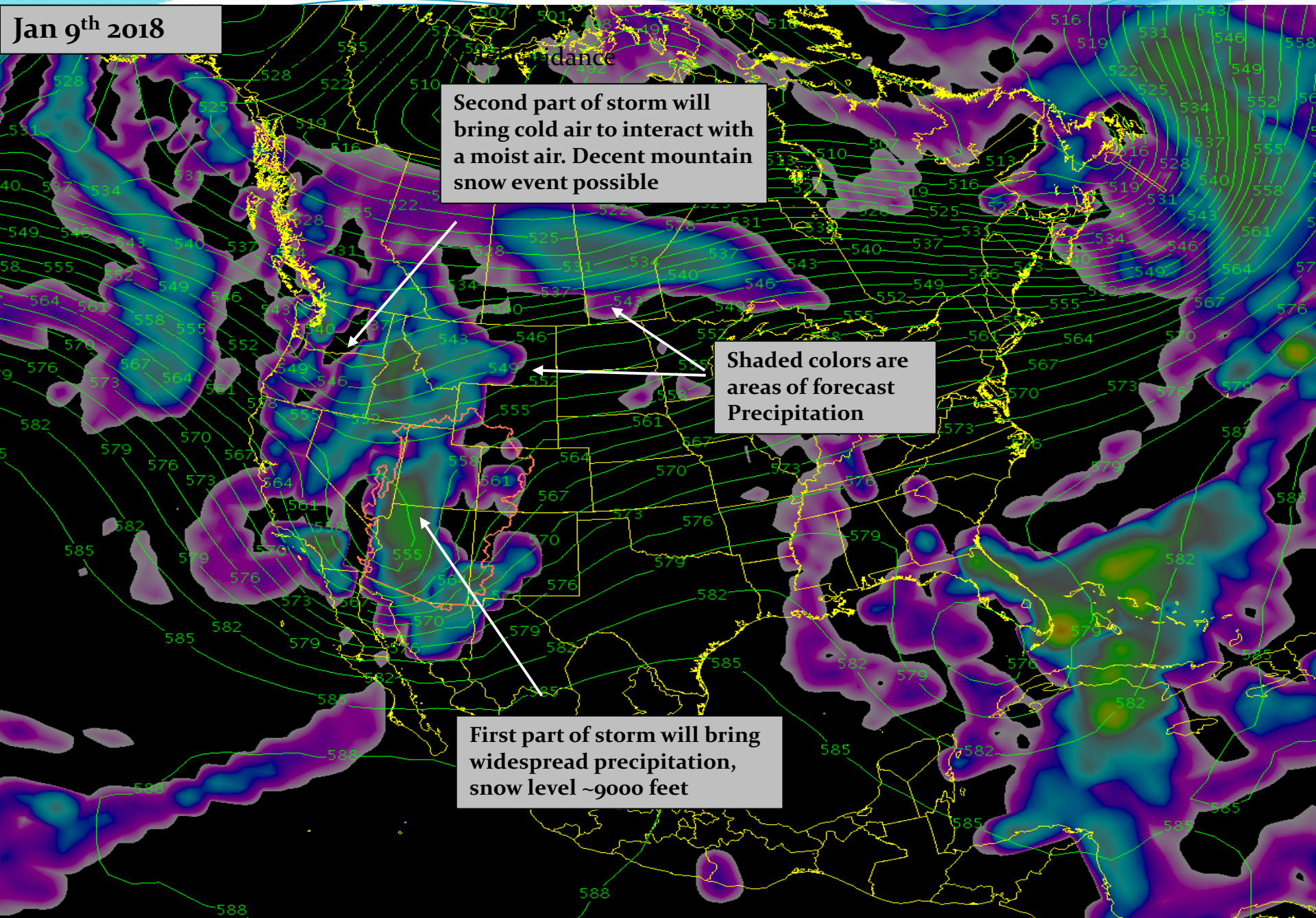


# Upcoming Weather and Impacts to Water Supply Forecasts

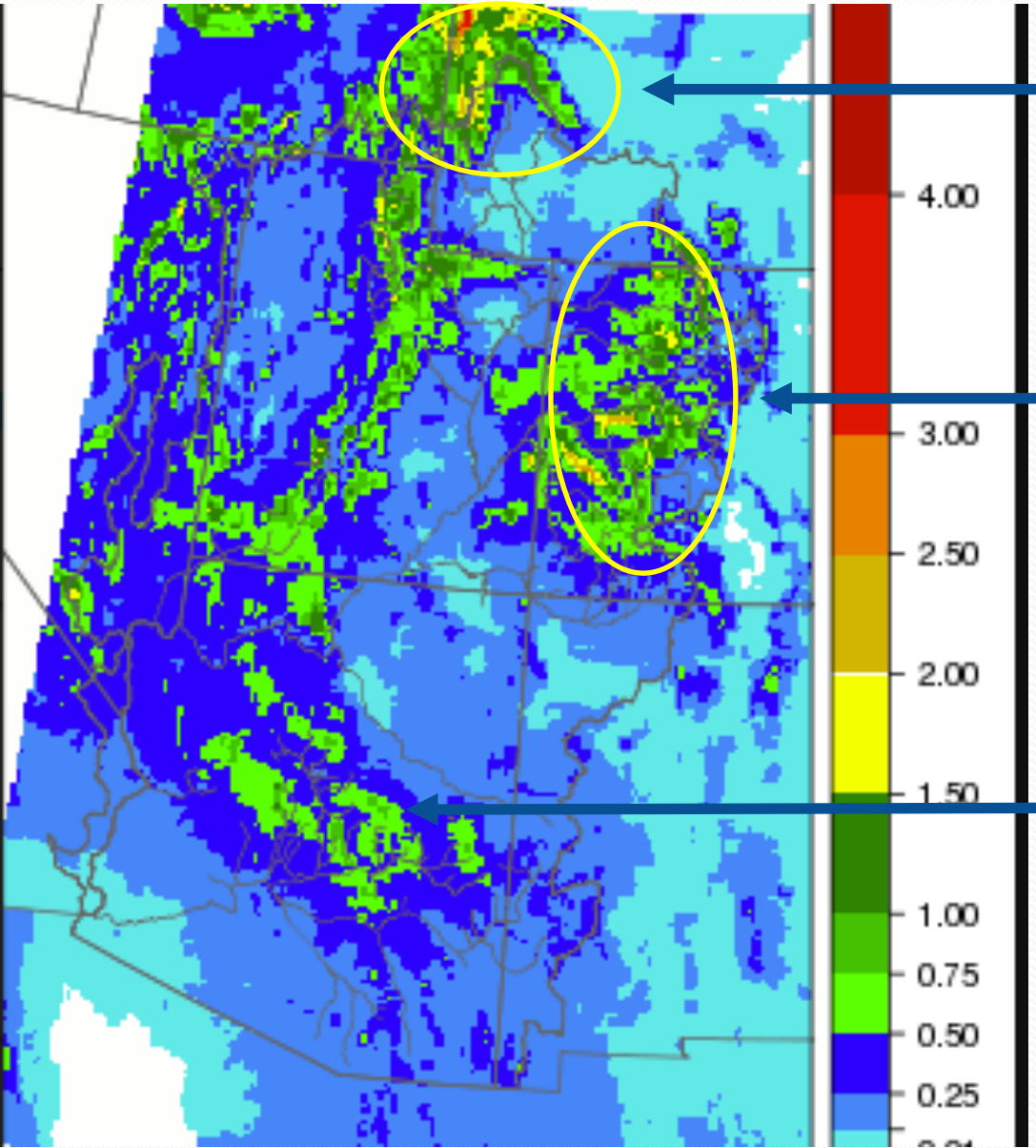


# Upcoming Weather and Impacts to Water Supply Forecasts



# Upcoming Weather and Impacts to Water Supply Forecasts

Precipitation the next 72 hours

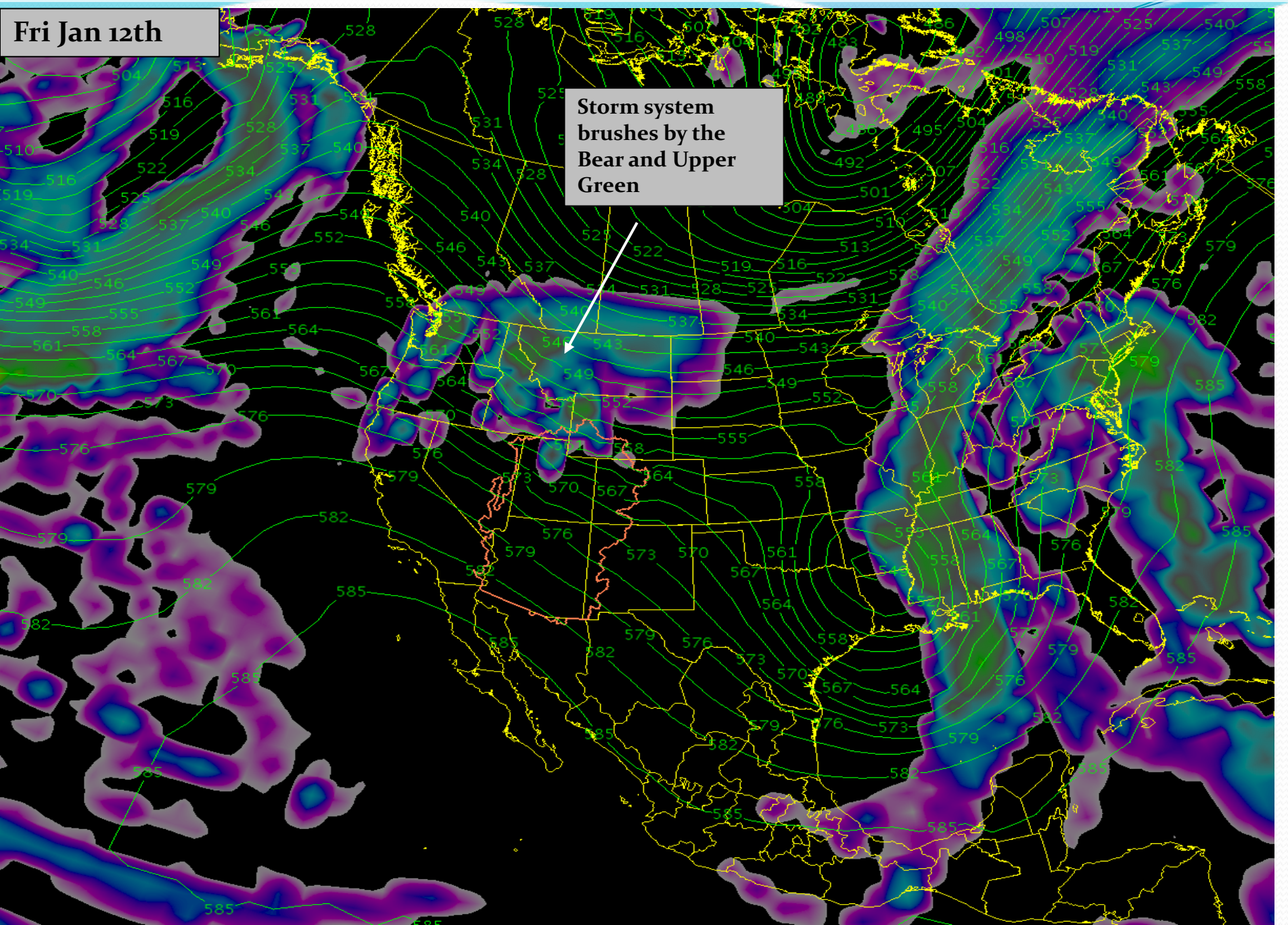



1-2+ inches of water upper Green Basin Headwaters

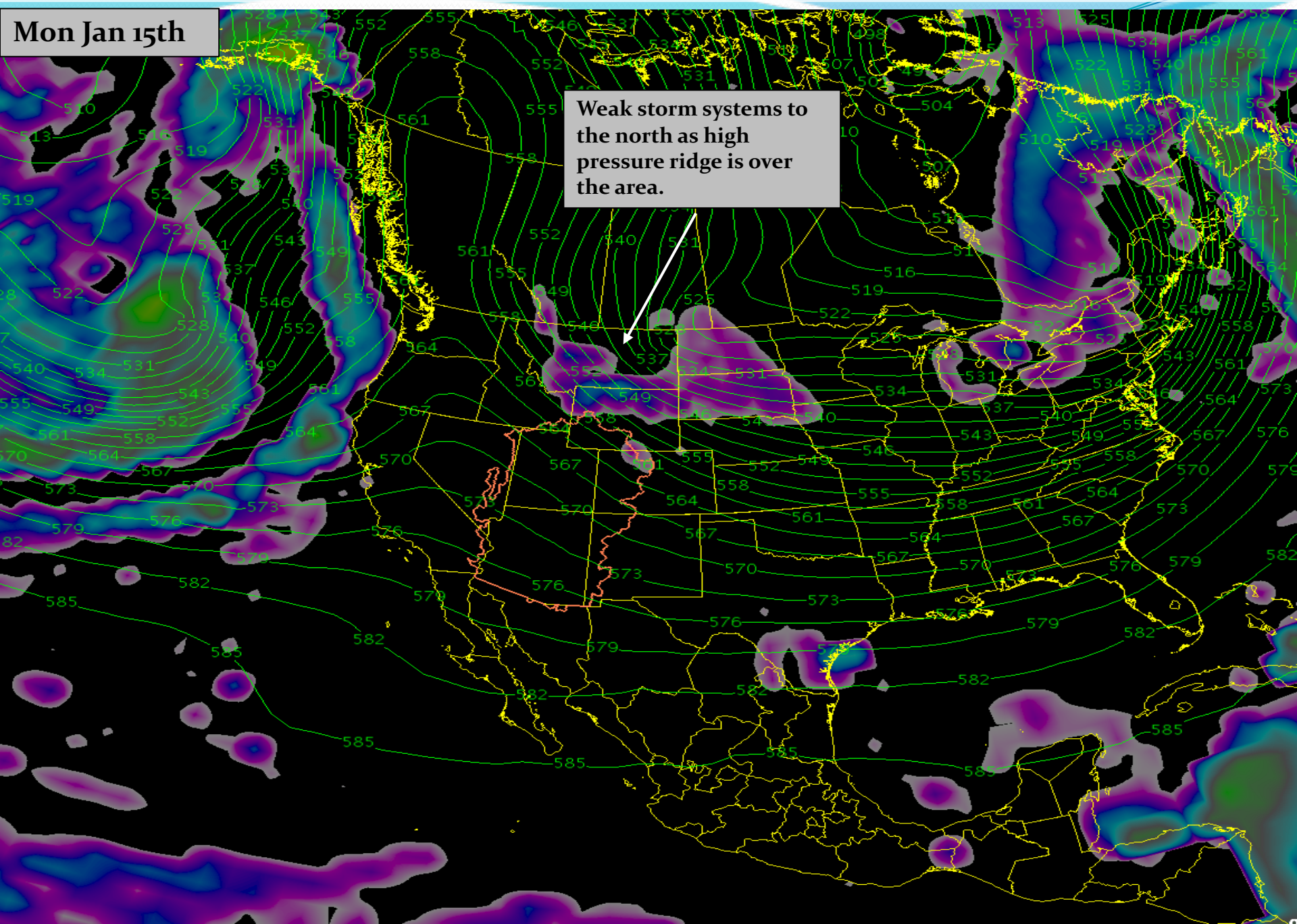
1-2 inches of water higher elevations in Colorado

Up to near 1.00 in mountains of Arizona

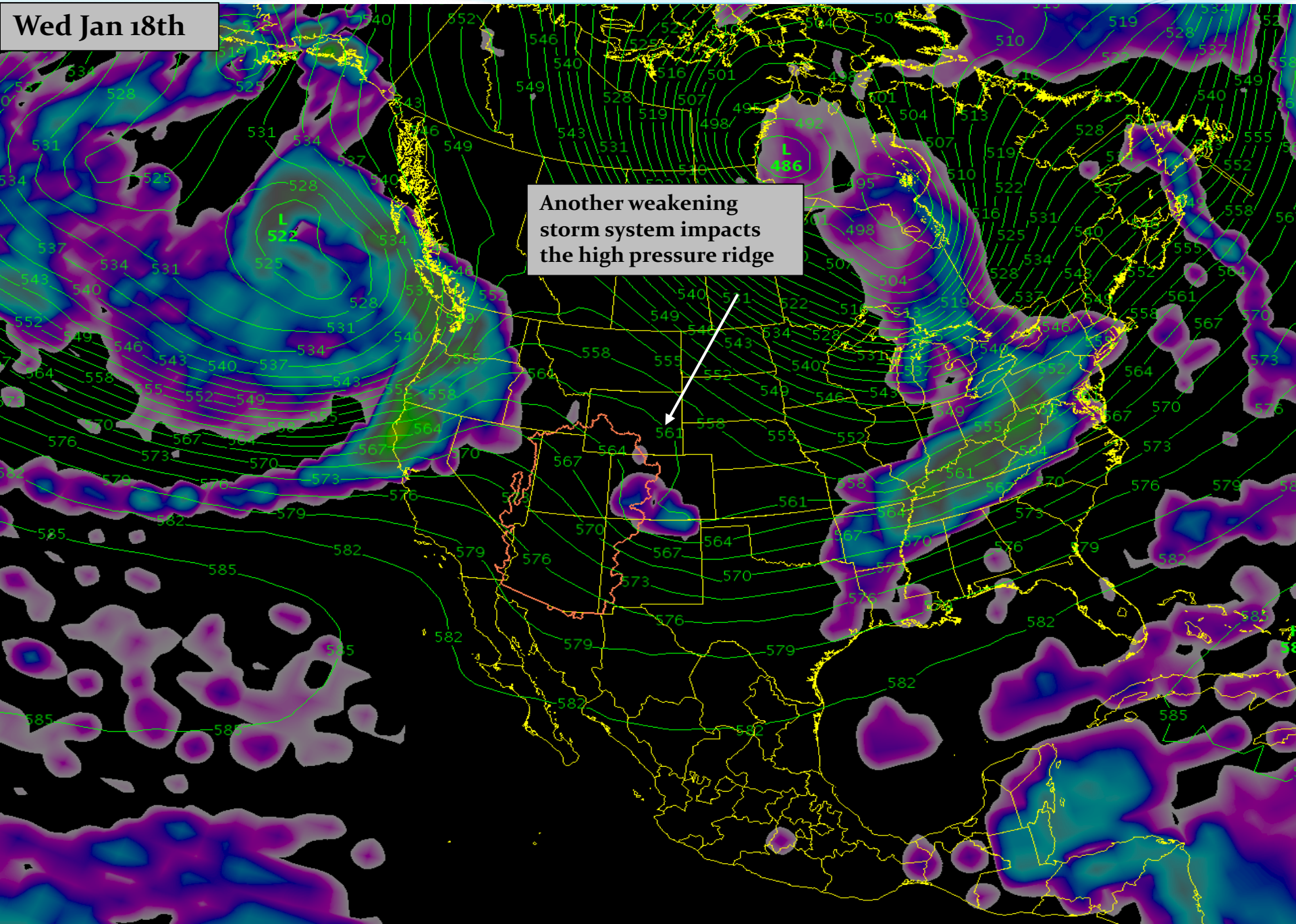
# Upcoming Weather and Impacts to Water Supply Forecasts



# Upcoming Weather and Impacts to Water Supply Forecasts

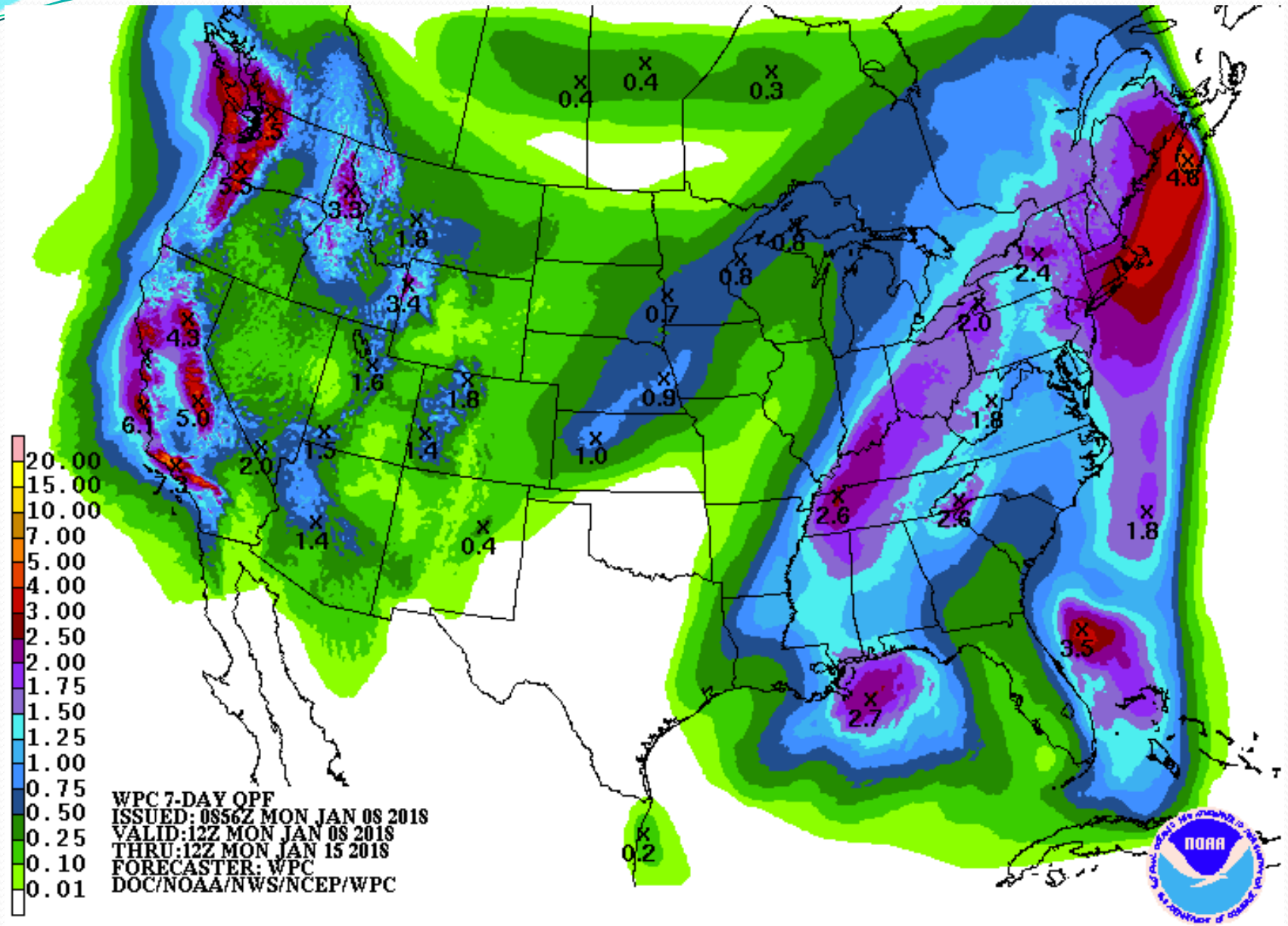


# Upcoming Weather and Impacts to Water Supply Forecasts



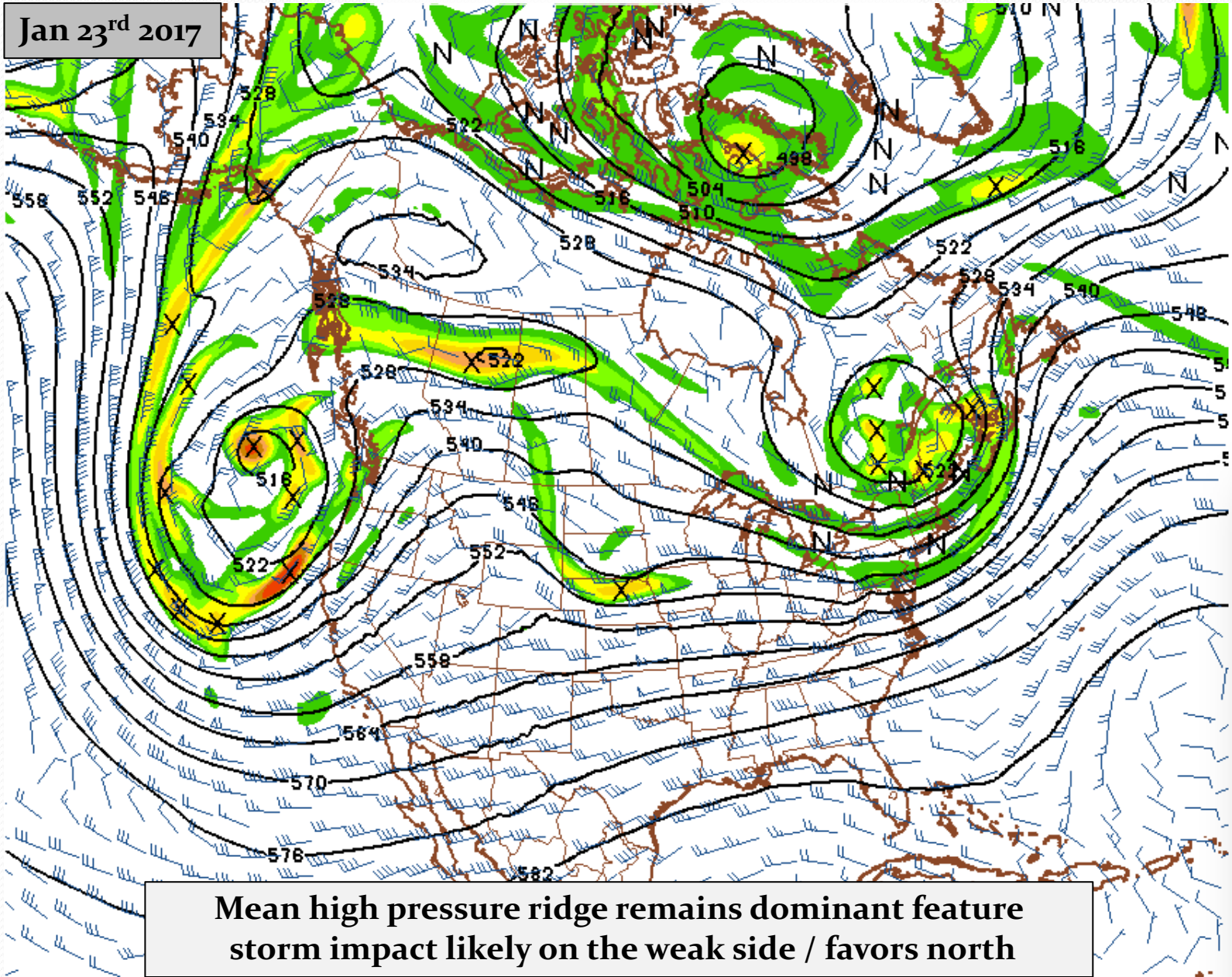
# Upcoming Weather and Impacts to Water Supply Forecasts

## NWS Weather Prediction Center: Precipitation Forecast Jan 8 – Jan 15



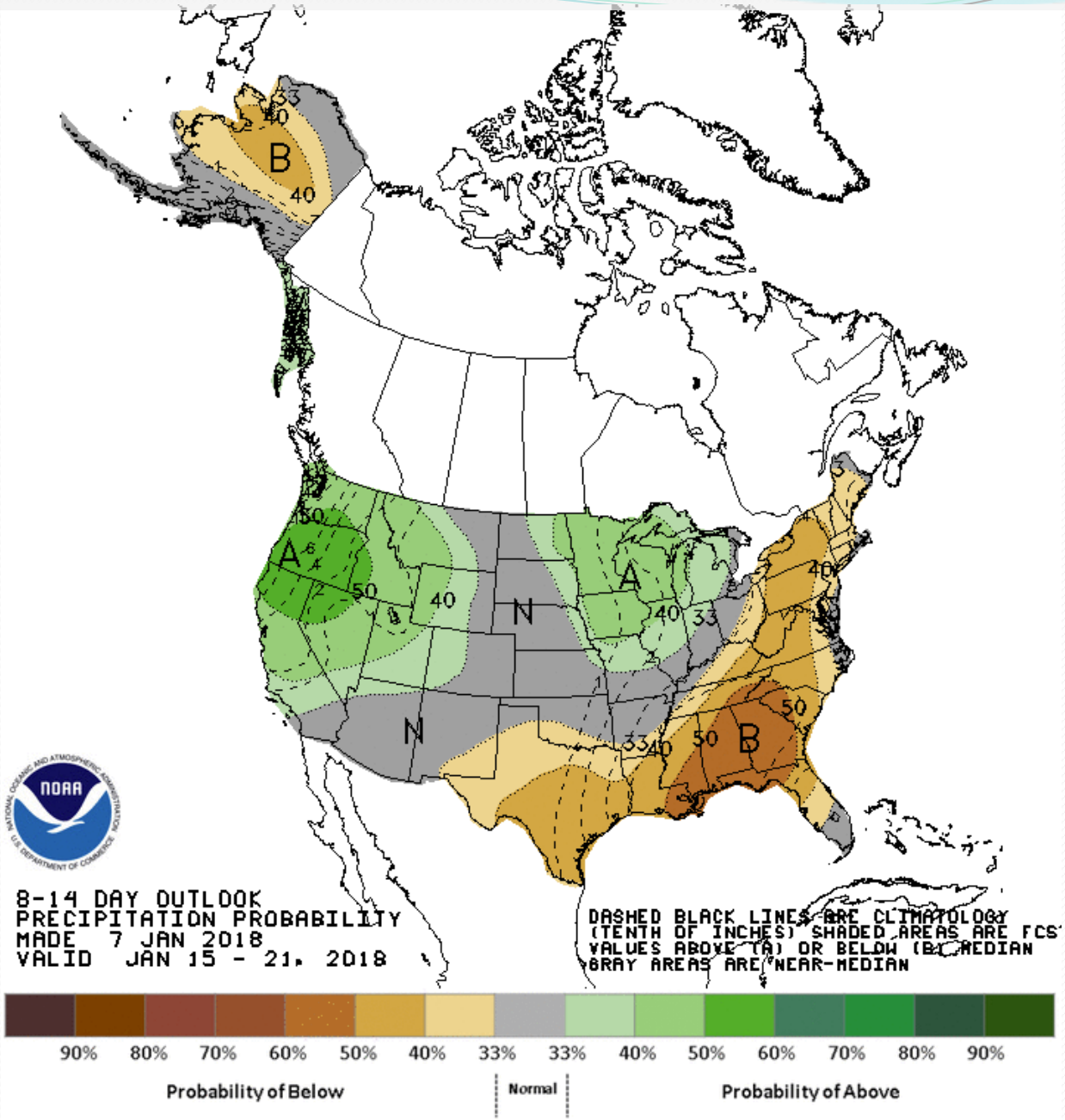
# Upcoming Weather and Impacts to Water Supply Forecasts

Meteorological Model : Long Range



# Upcoming Weather and Impacts to Water Supply Forecasts

## NWS Climate Prediction Center: Precipitation probability Jan 15 – Jan 21



# Key Points

Very dry fall and early winter for most areas. Many sites with record low snow for early January. (Exceptions northern Green, Colorado headwaters)

Soil moisture and precipitation signal are both on the positive (wet) side in the northern Green headwaters and eastern Colorado mainstem headwaters. The signals are negative (dry) in southwest Colorado (Dolores/San Juan) and the Lower Colorado River Basin.

Initially low forecasts are widespread. Storm system this week should impact water supply guidance favorably in the short term. If dry conditions prevail the last 2 weeks of January guidance may end up similar to Jan 1st forecasts.

There is still a large range of forecast probabilities. We've seen extreme scenarios recently. It's still very early in the season.

Long term our model uses average conditions (climatology). A wet month in the future mix would result in some rebound in water supply forecasts.

# 2018 water supply briefing schedule

- 2018 monthly water supply briefings for the Colorado Basin
  - Wednesday Feb 7th @ 11 am MT
  - Wednesday Mar 7th @ 11 am MT
  - Thursday Apr 5th @ 11 am MT
  - Monday May 7th @ 11 am MT
  - Great Basin webinars are same dates at 1:30 pm MT
- Peak flow briefing early March. Additional briefings scheduled as needed.
- 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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