Colorado Basin
Water Supply Briefing

February 7 2018

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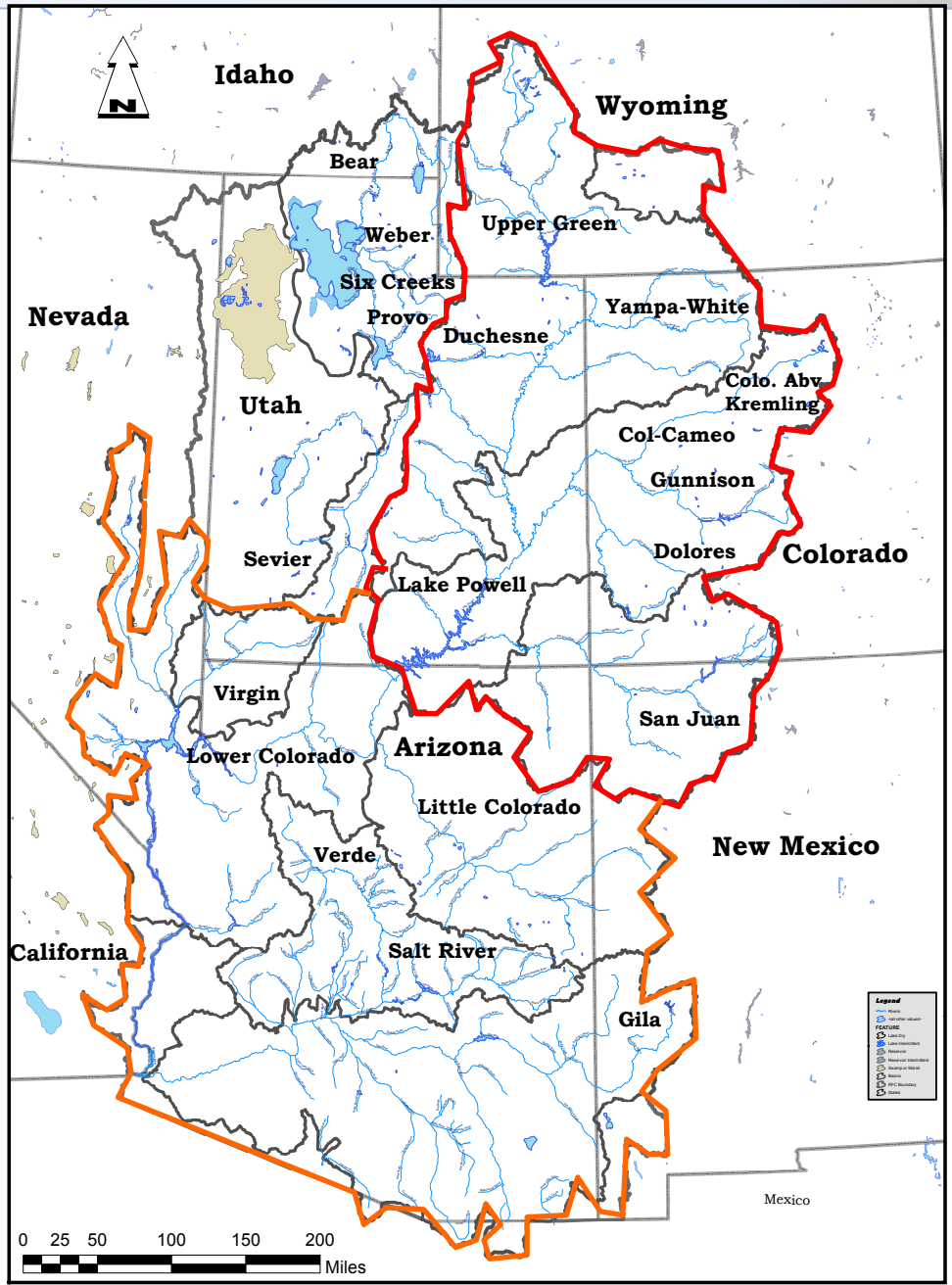
Passcode: 1706374

Please mute your phone until the question period

CBRFC Forecast Areas



Today's Presentation

January weather – Mild and Dry, Again !

Current Snowpack Conditions-Record Low in Some Areas

2018 Water Supply Forecasts – February Update

Select Forecast Site Review – Any Chance to get to Average?

February Forecast Error – Much Improvement Over January?

Upcoming Weather – Below Average Precipitation Again in February?

Contacts & Questions

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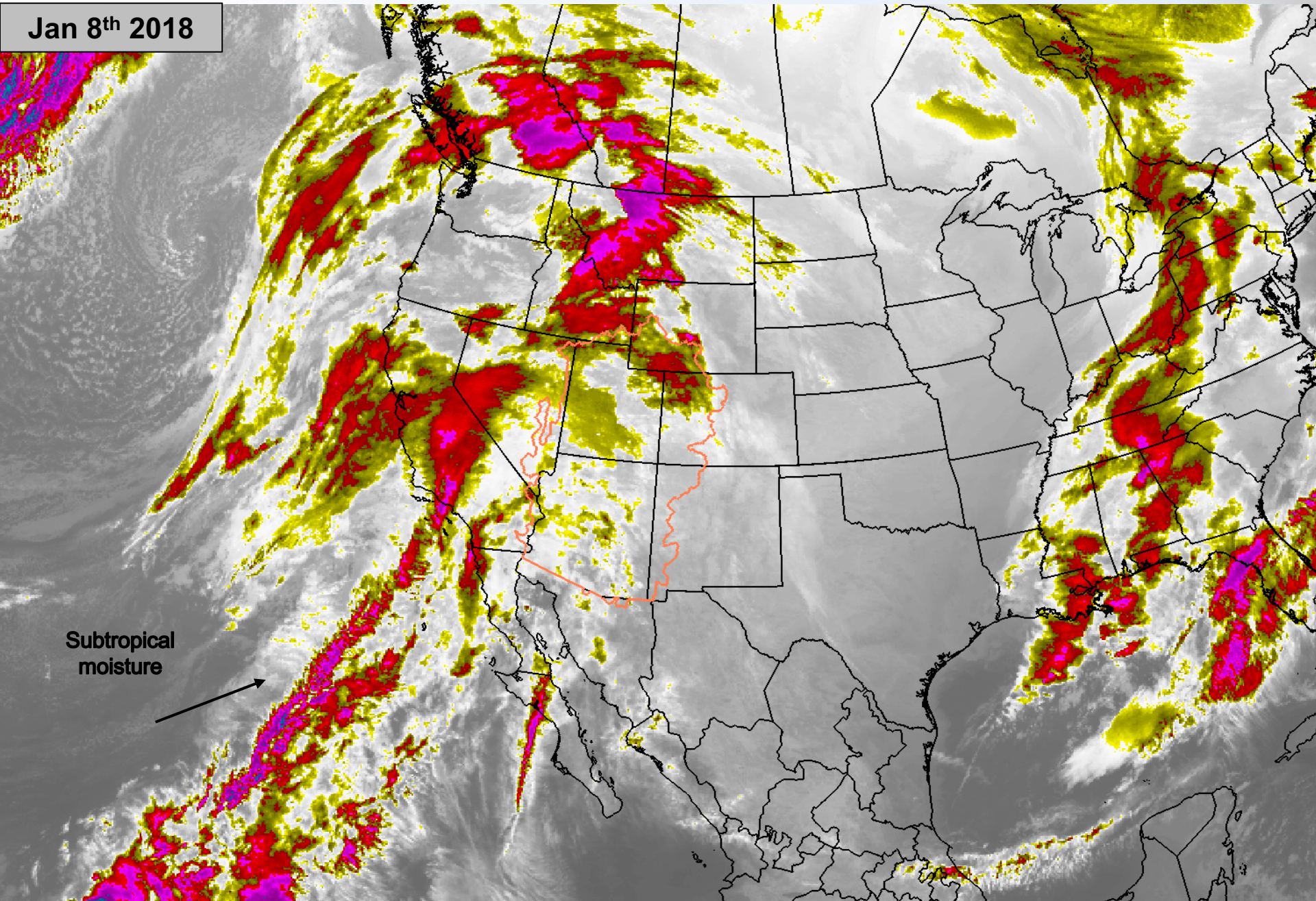
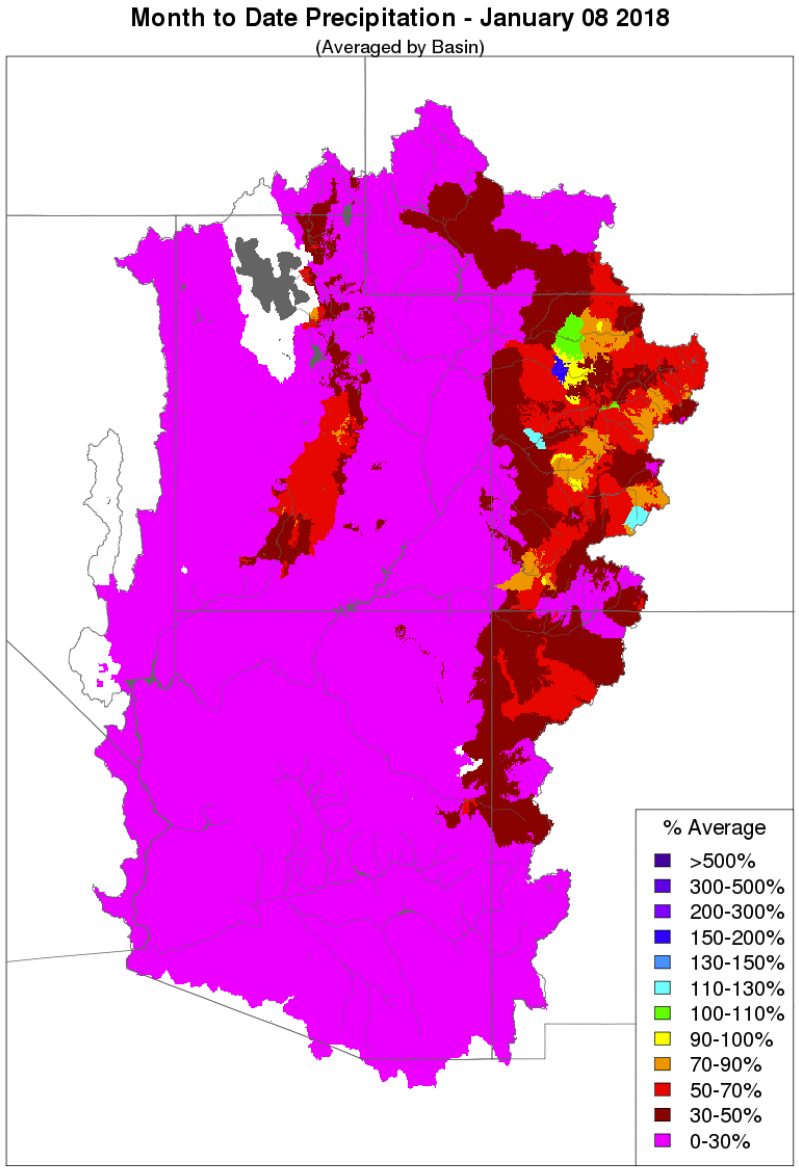
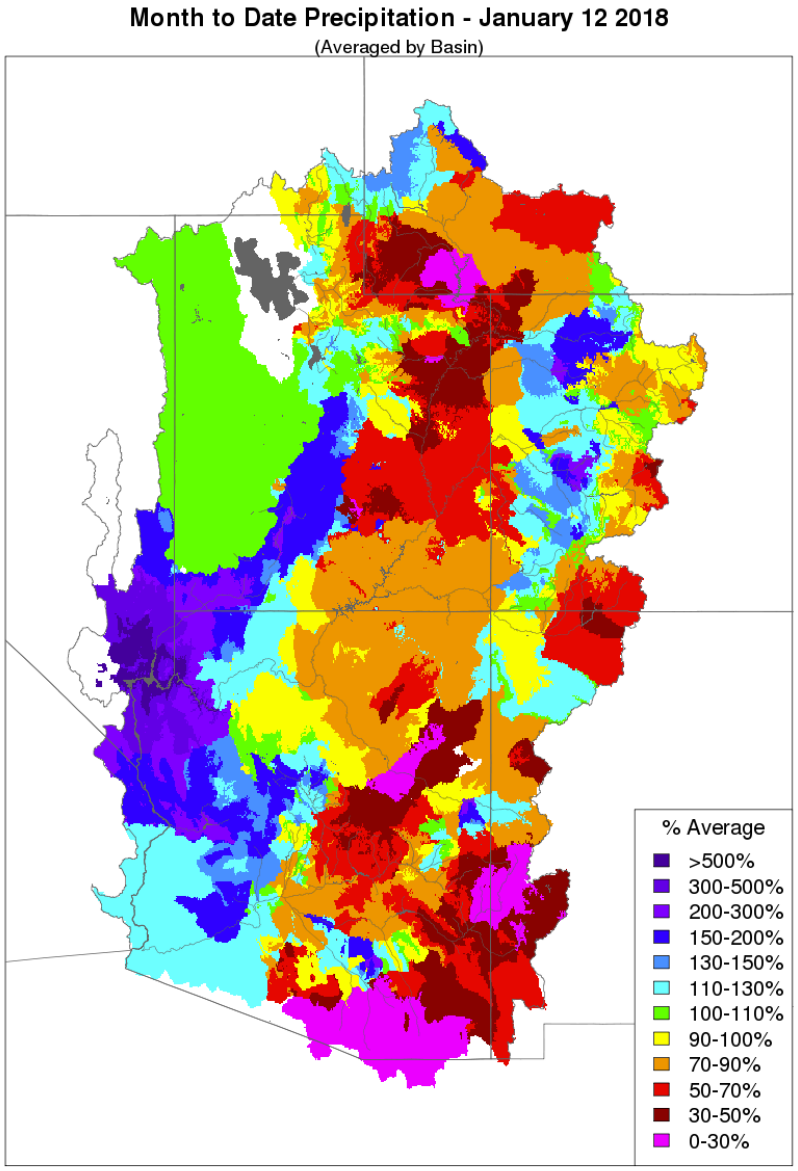
Early January storm system brought widespread (but light) precipitation amounts



Early January storm system

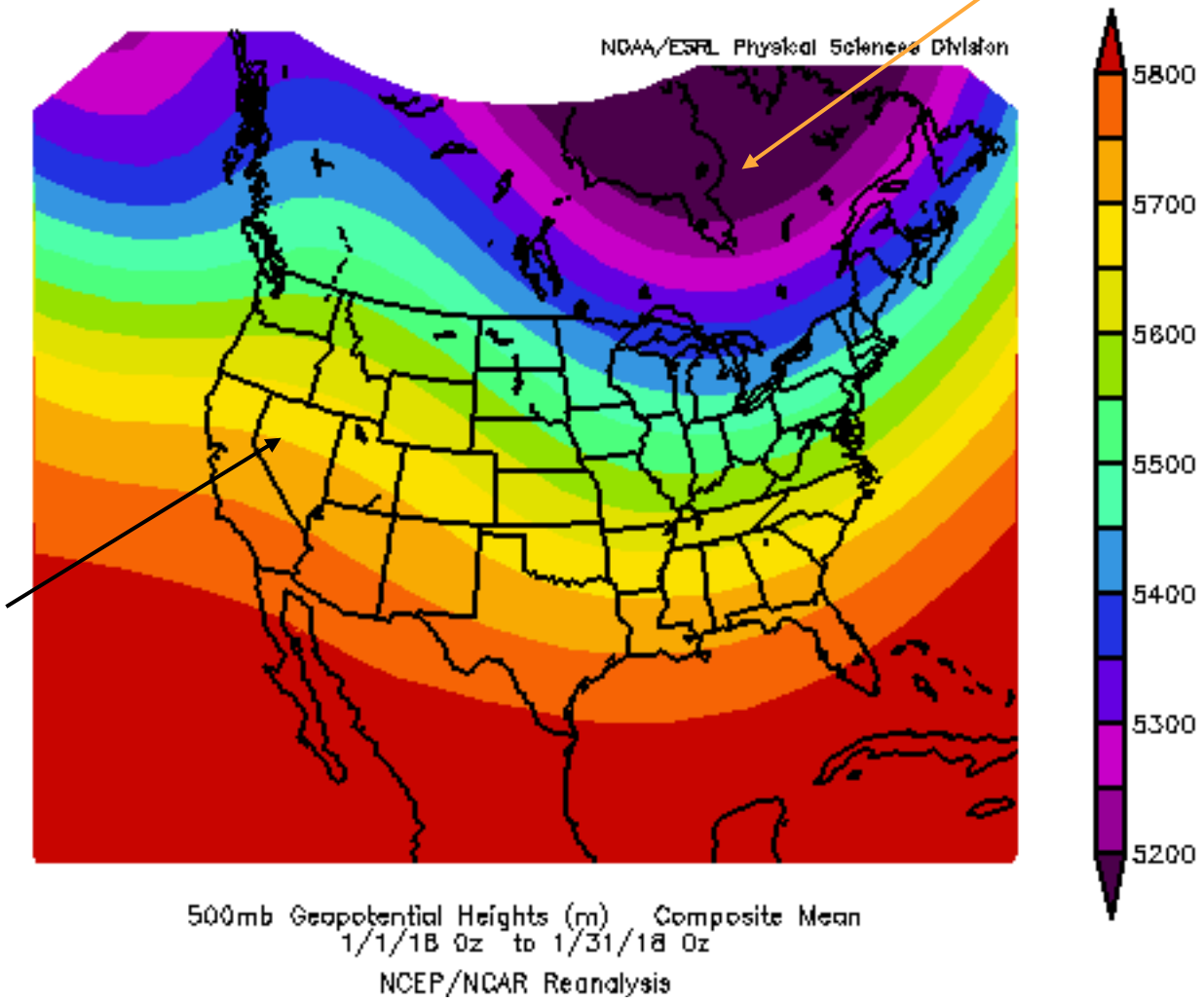




January weather

Mean Atmospheric Pattern
January 2018

Strong persistent Low in the east



Mean high pressure in the west

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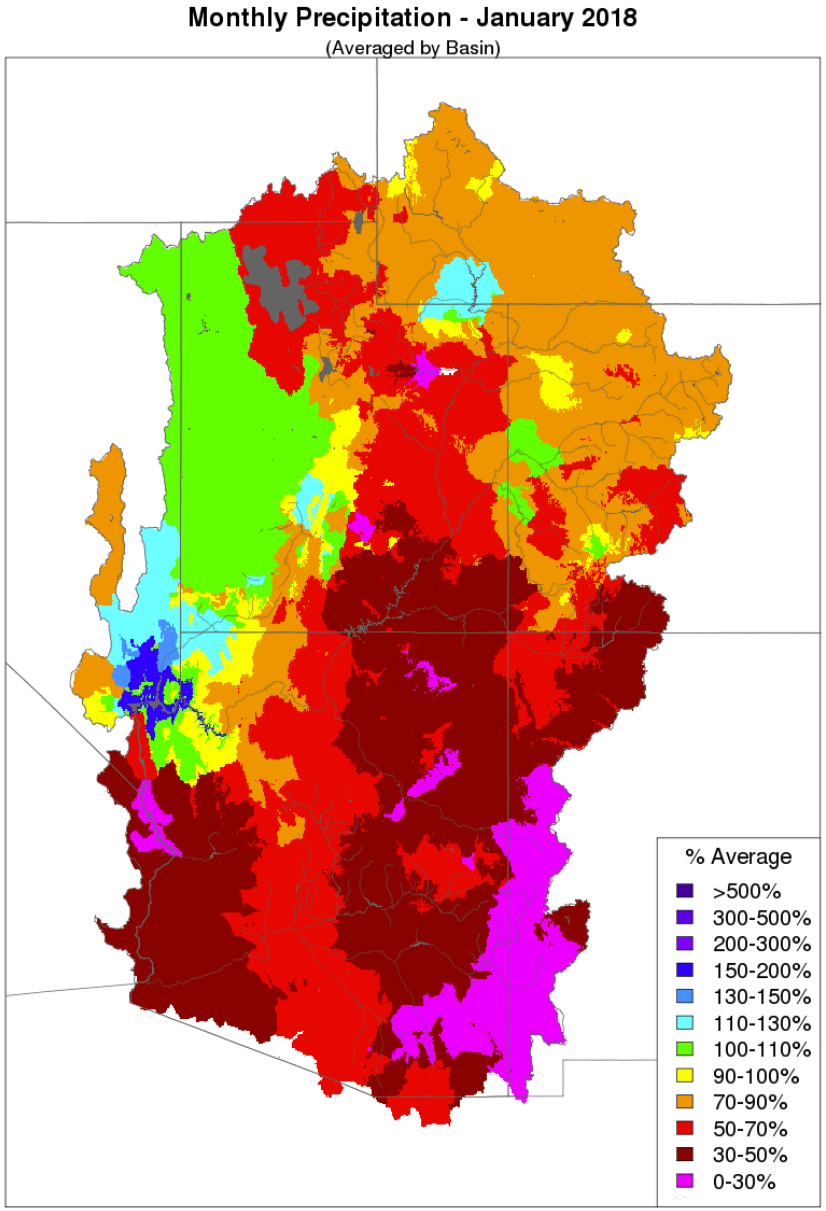
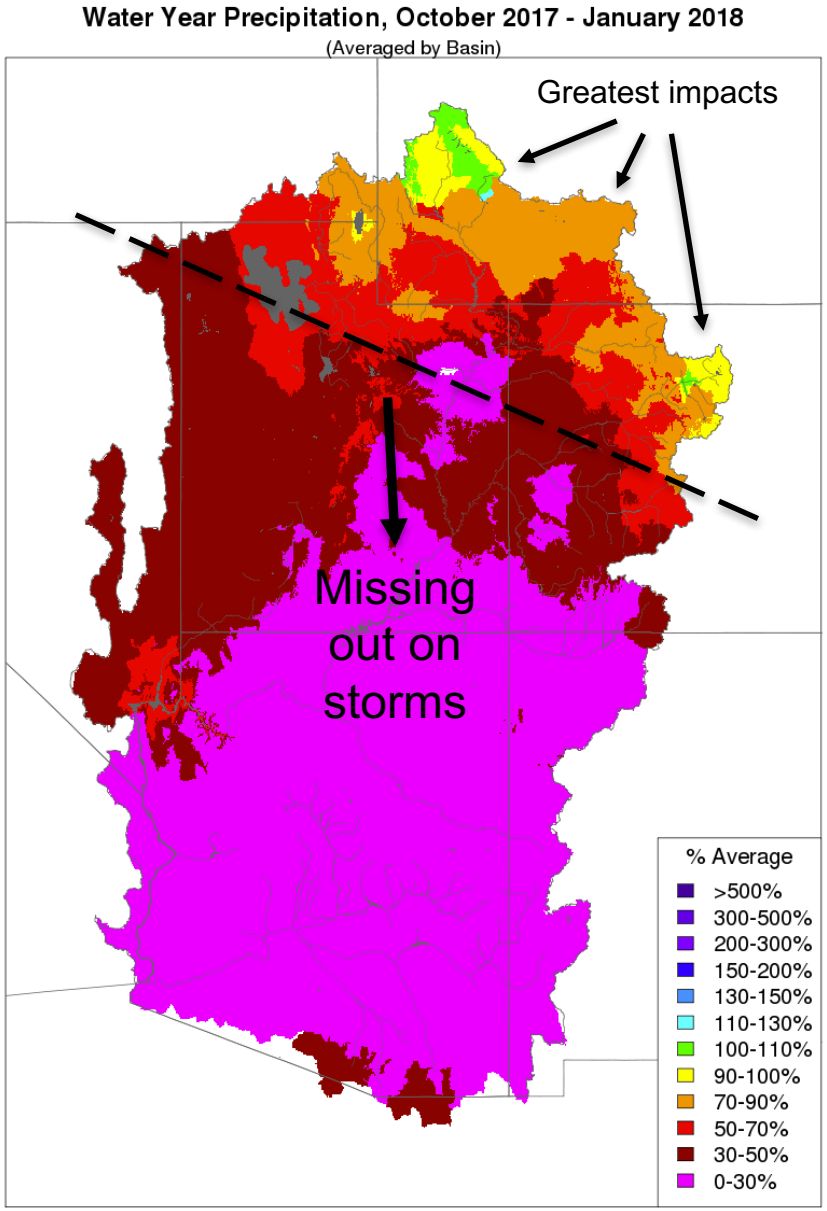
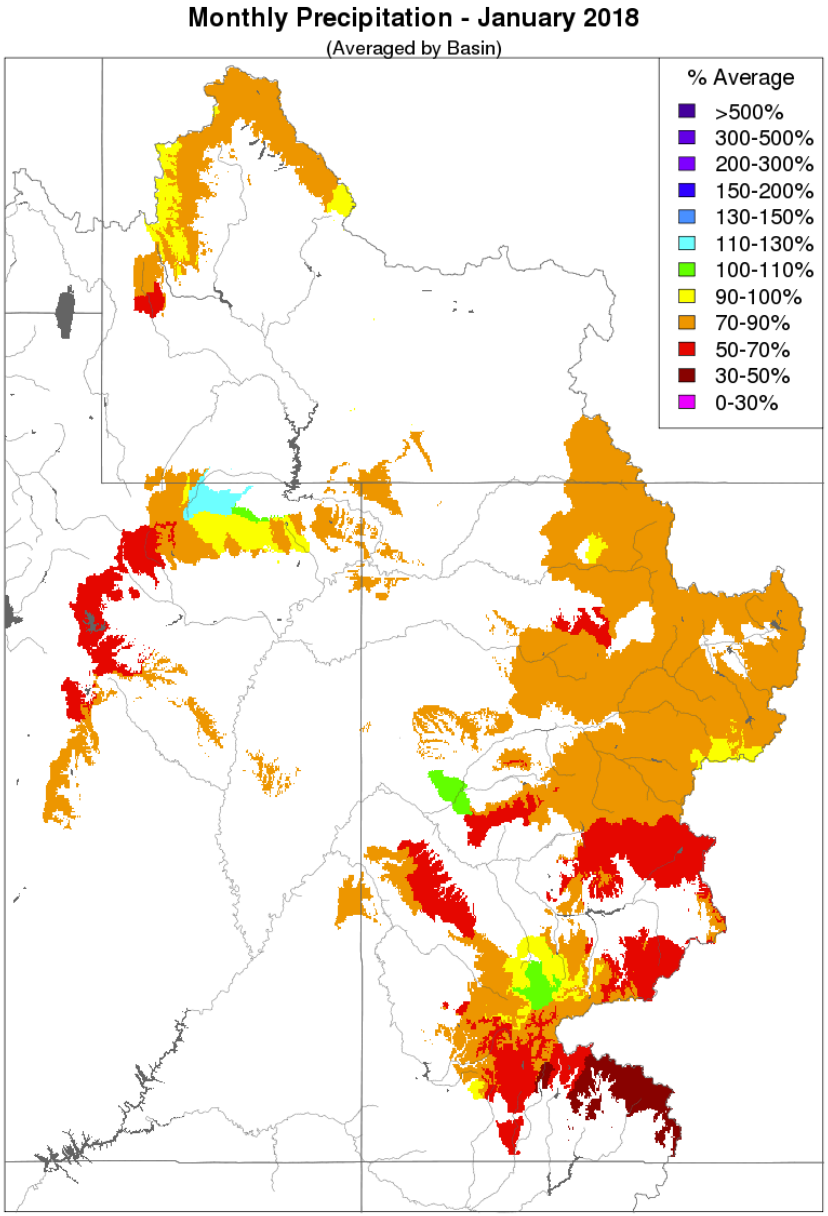
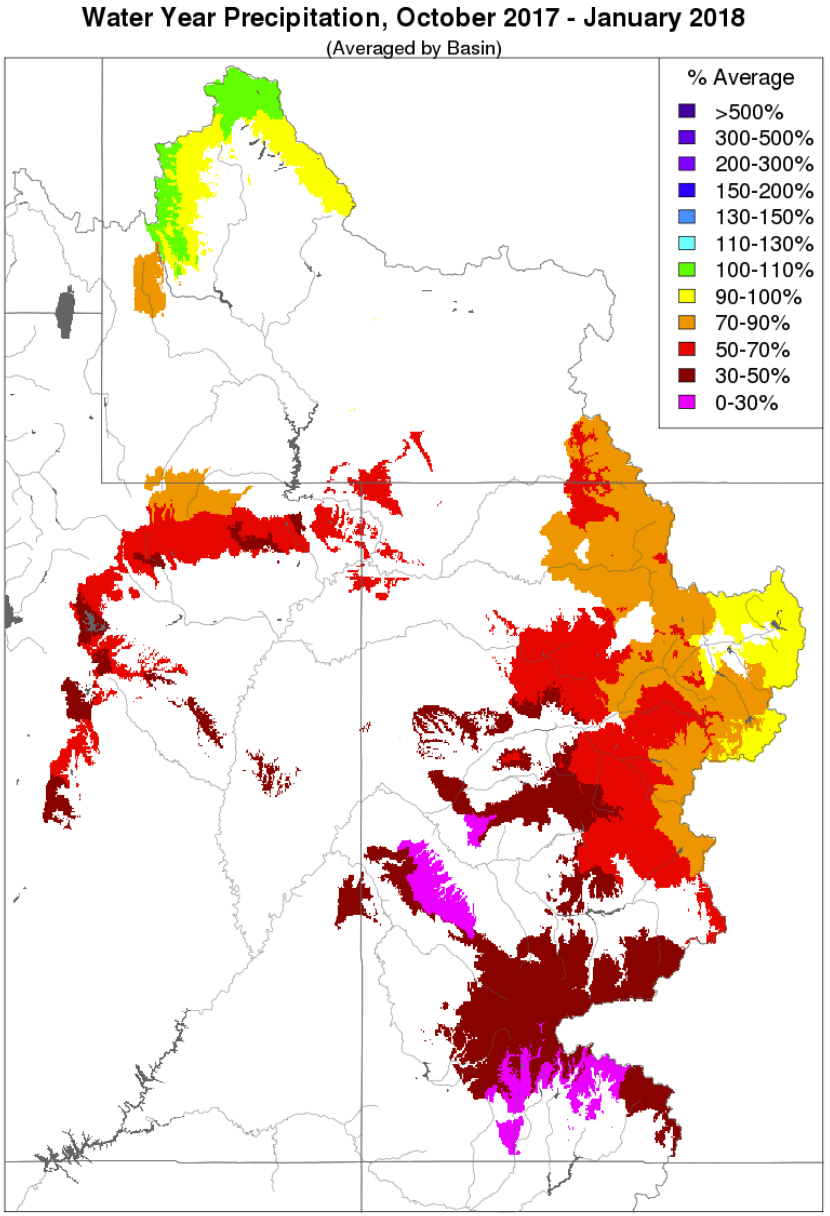
January / Water Year Precipitation





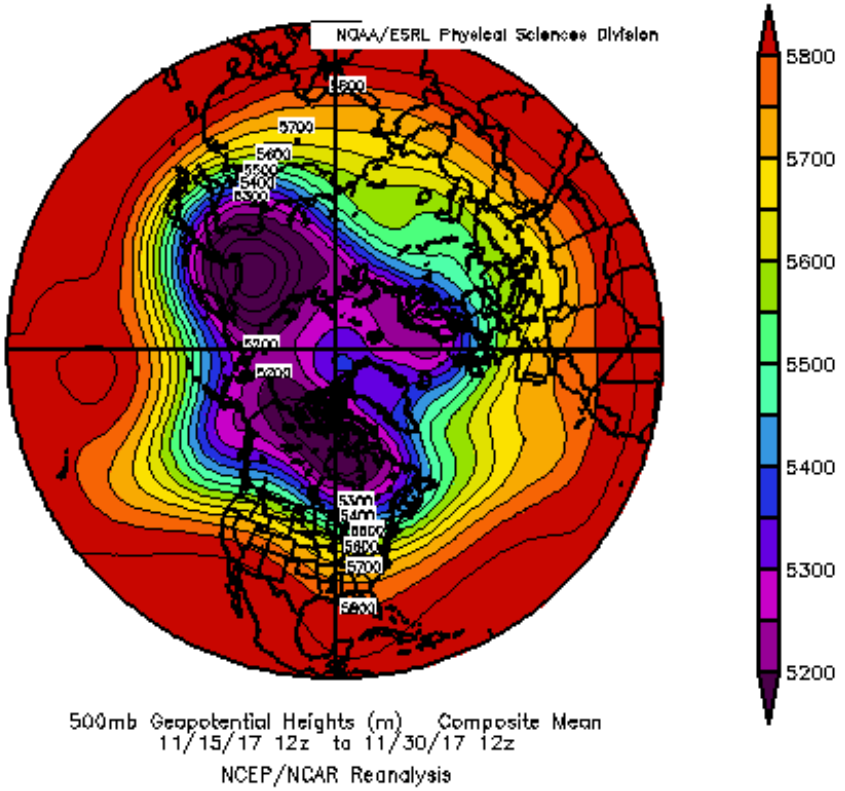
January / Water Year Precipitation – primary contributing areas





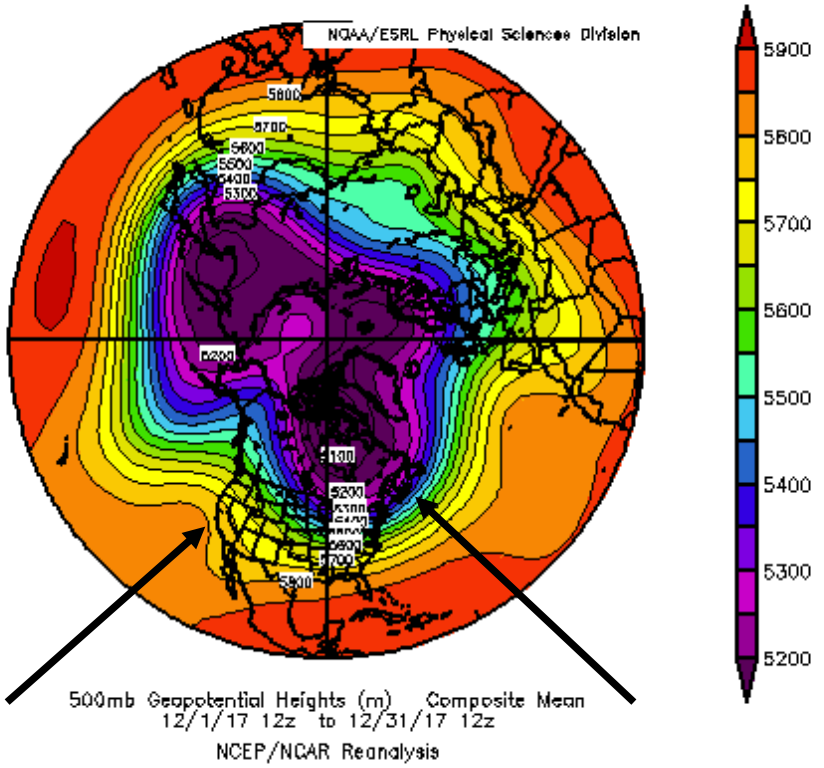
Fall / Early Winter – Dry pattern becomes established and is persistent

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

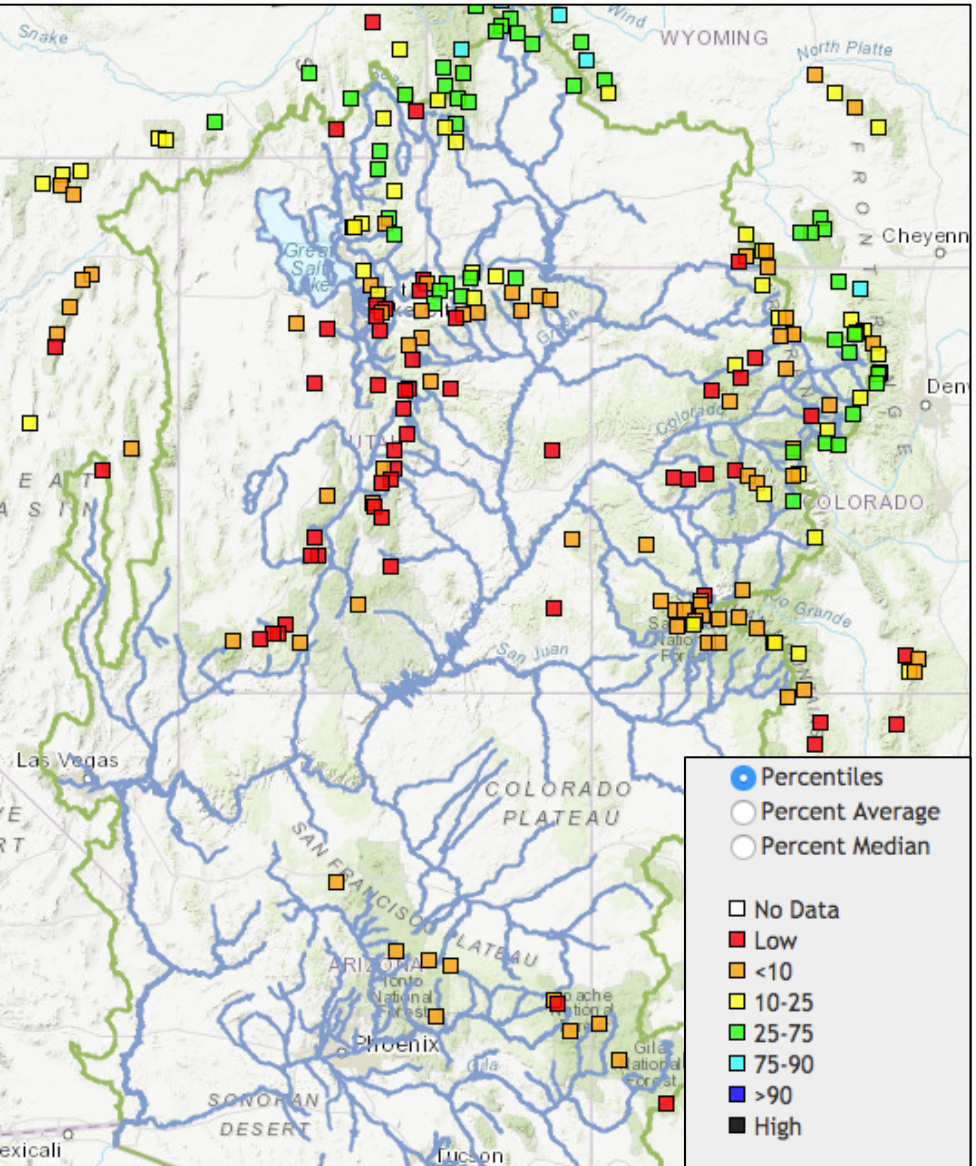


Blocking high pressure ridge firmly established – strong Hudson Bay low

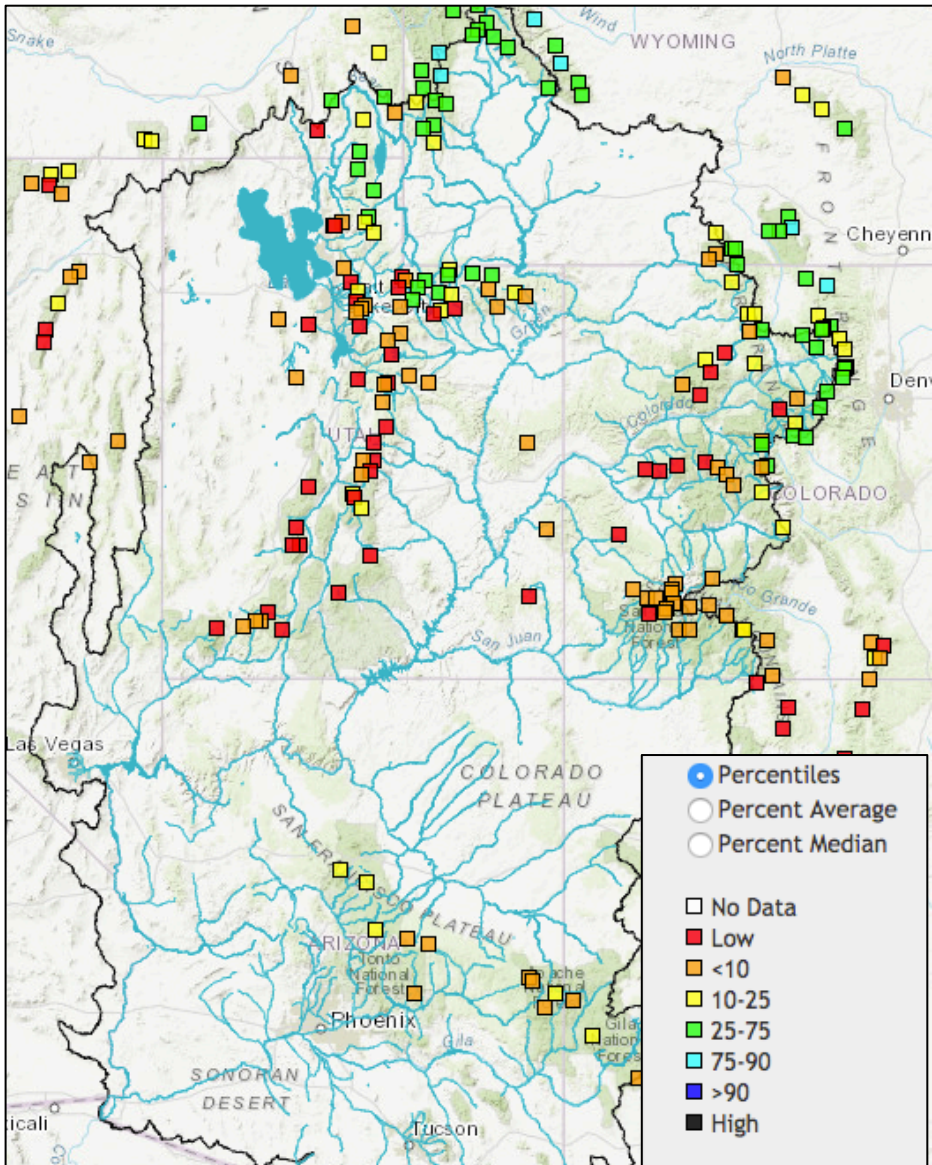
Snow Conditions – Just How Dry Has This Season Been ?
SWE historical Rankings

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

January 8th 2018



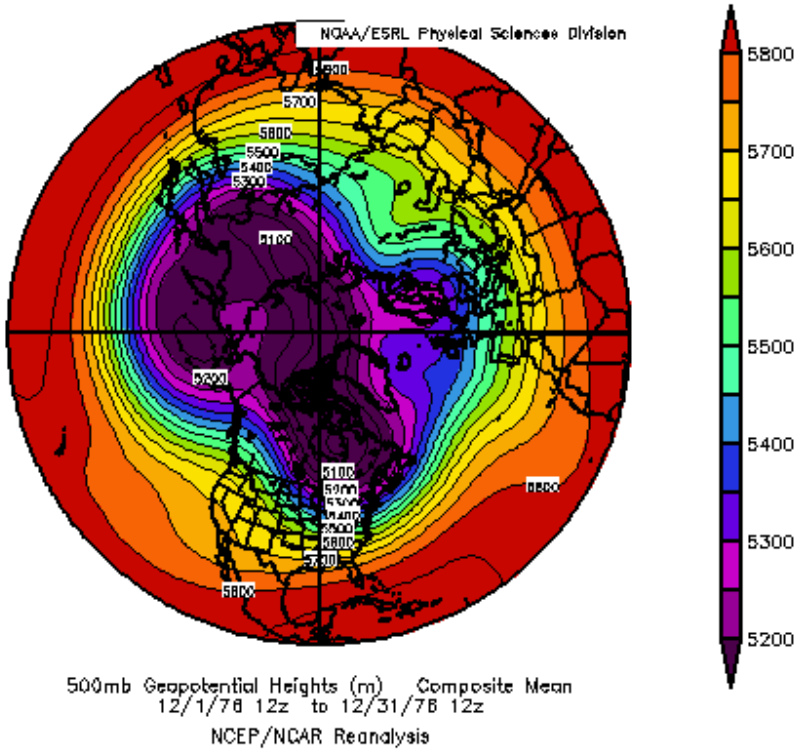
February 6th 2018



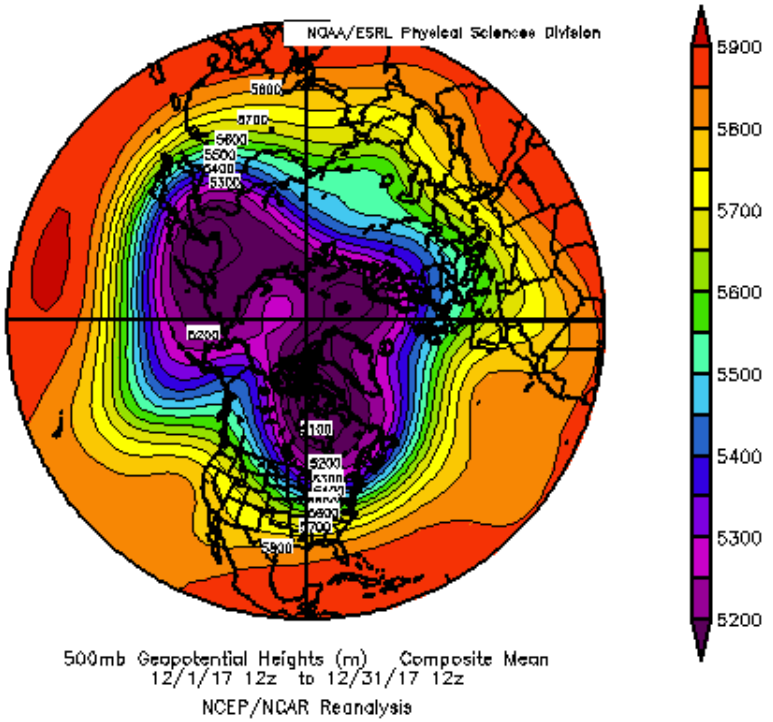
Dry seasons have happened in the past (1990, 2002, 1977 etc.)

How does year compare ?

Atmospheric Pattern
December 1976

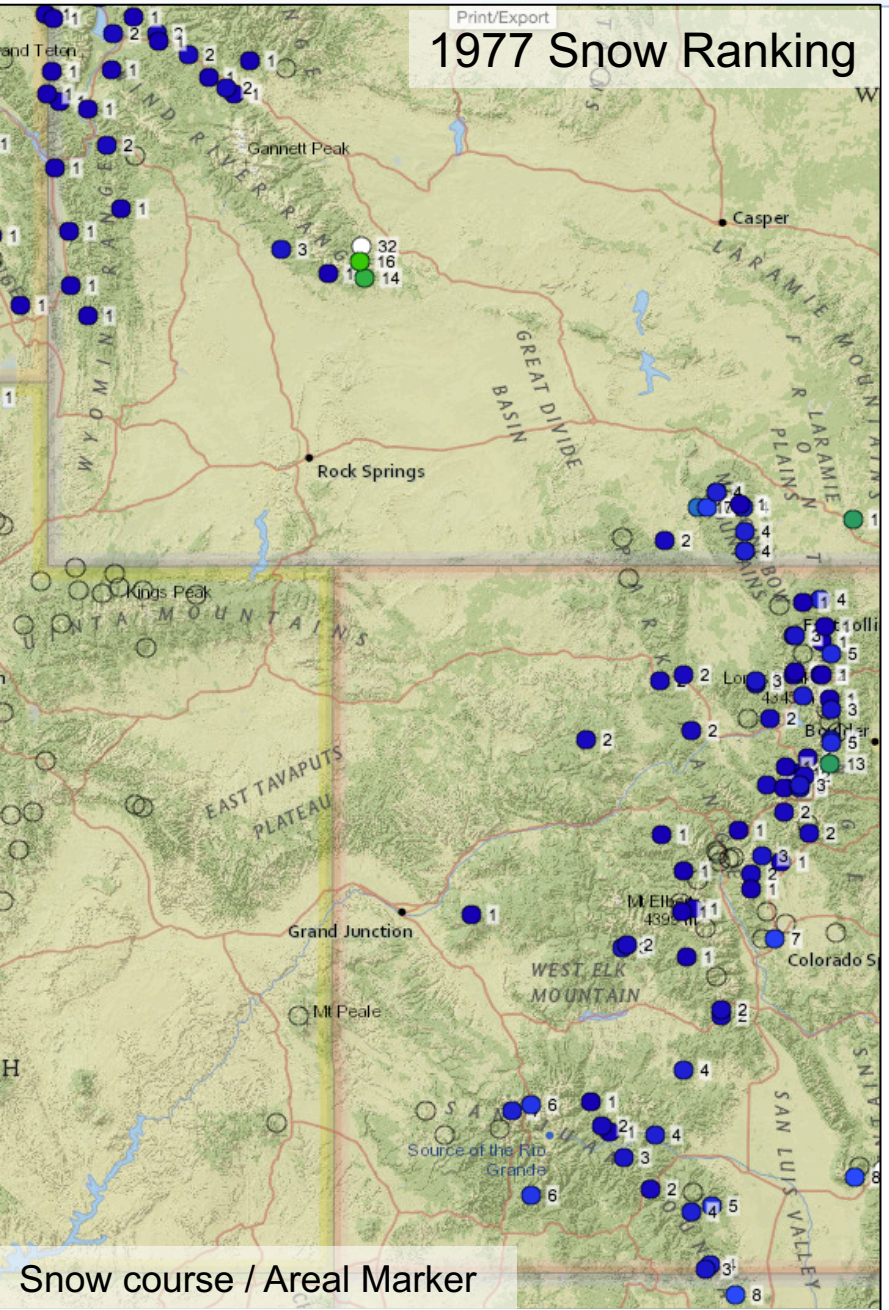


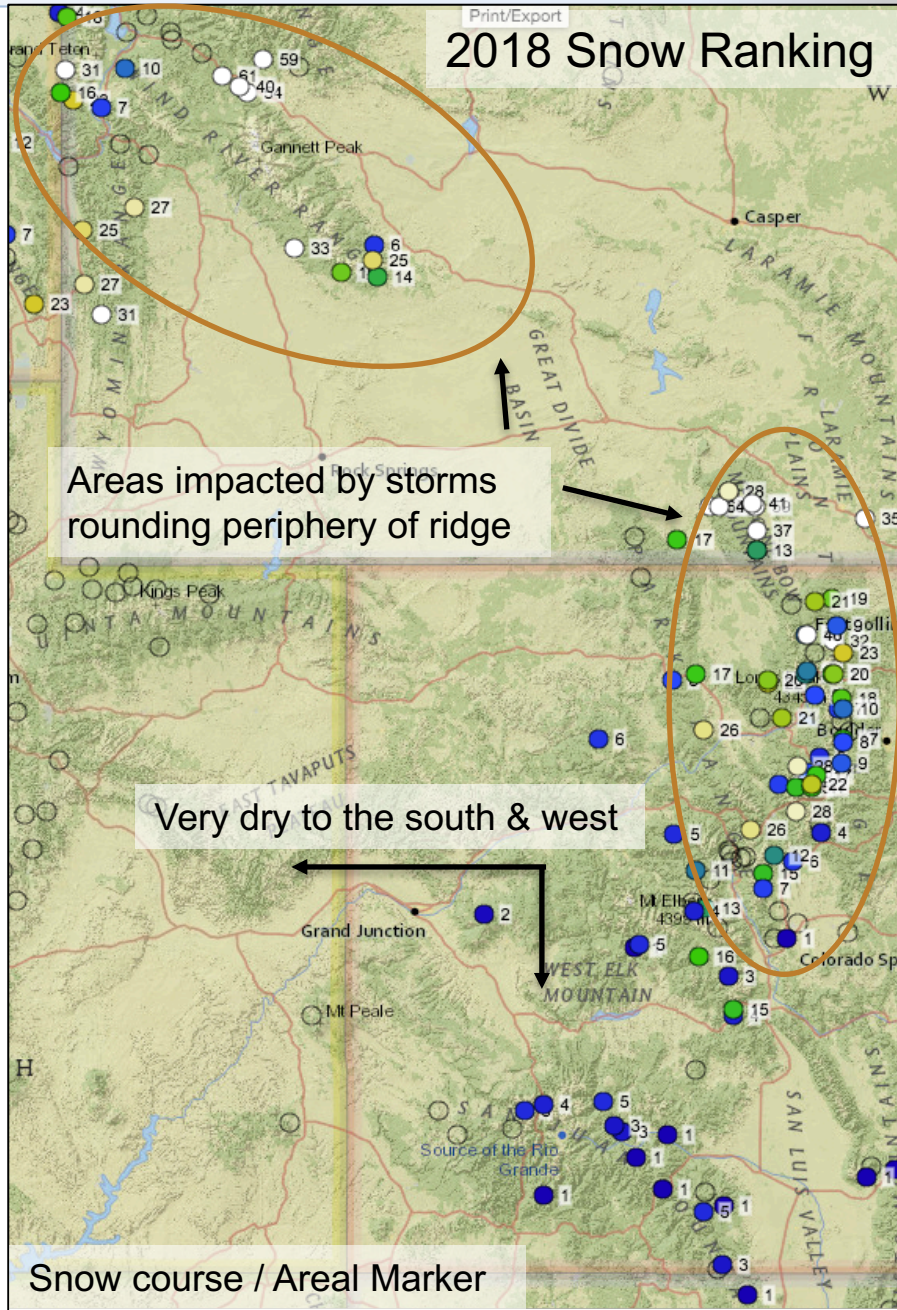
Atmospheric Pattern
December 2017



Previously 1976/77 winter was referenced because it stands out as one of the lowest snow years. There were also some similarities in the late fall / early winter atmospheric pattern. Many record low flows were established in 1977 or 2002.

Minimum snow ranking (pre-SNOTEL sites, various period of records, Min 45 years)

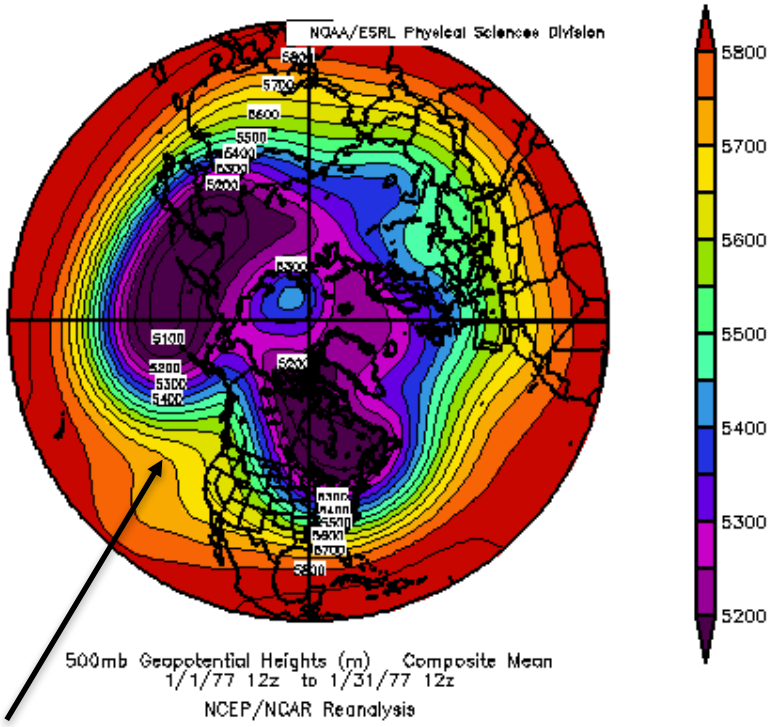




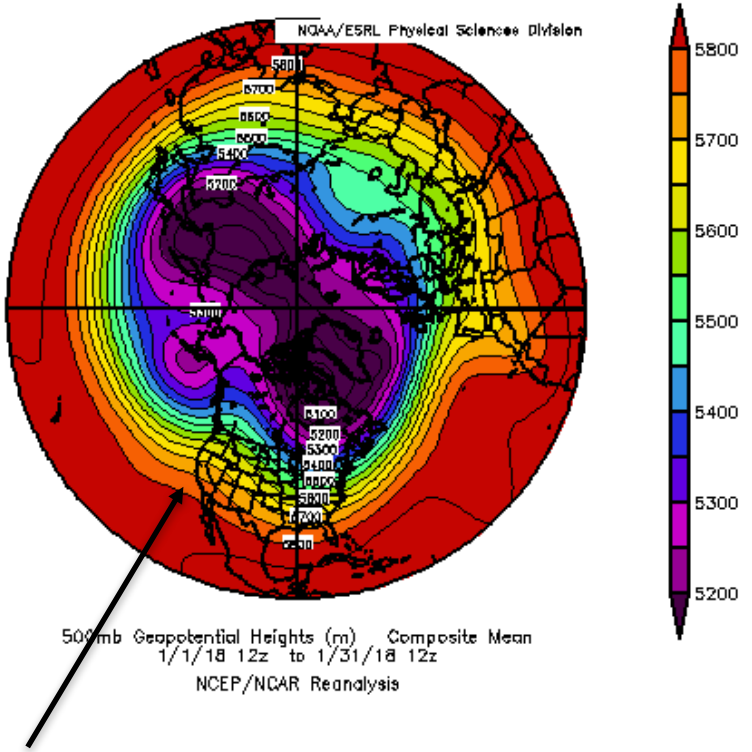
Comparing the January patterns.

Similarities in large scale features but some subtle differences as we get into January.
Location of ridge axis – strength of ridge – Pacific Ocean features

Mean Atmospheric Pattern
January 1977

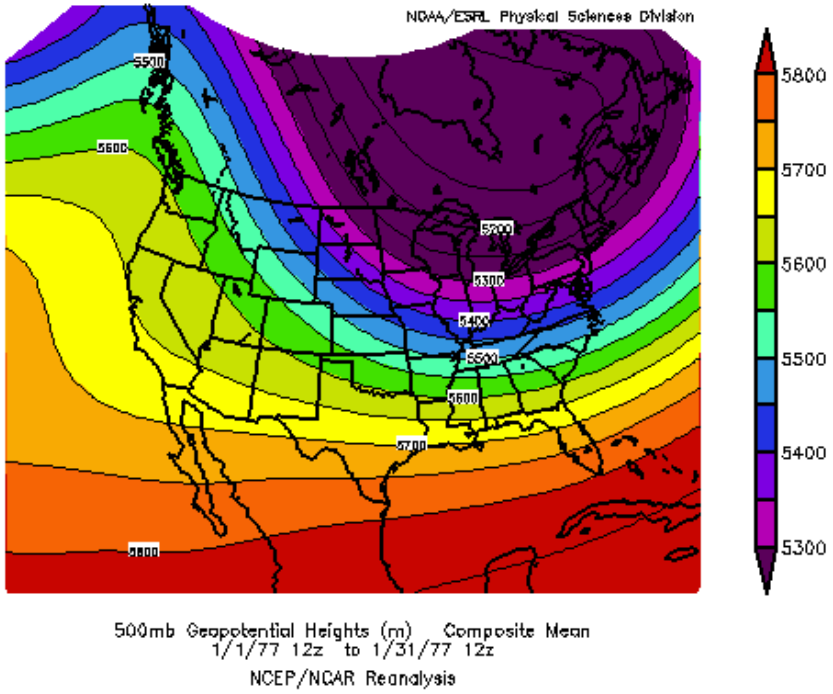


Mean Atmospheric Pattern
January 2018

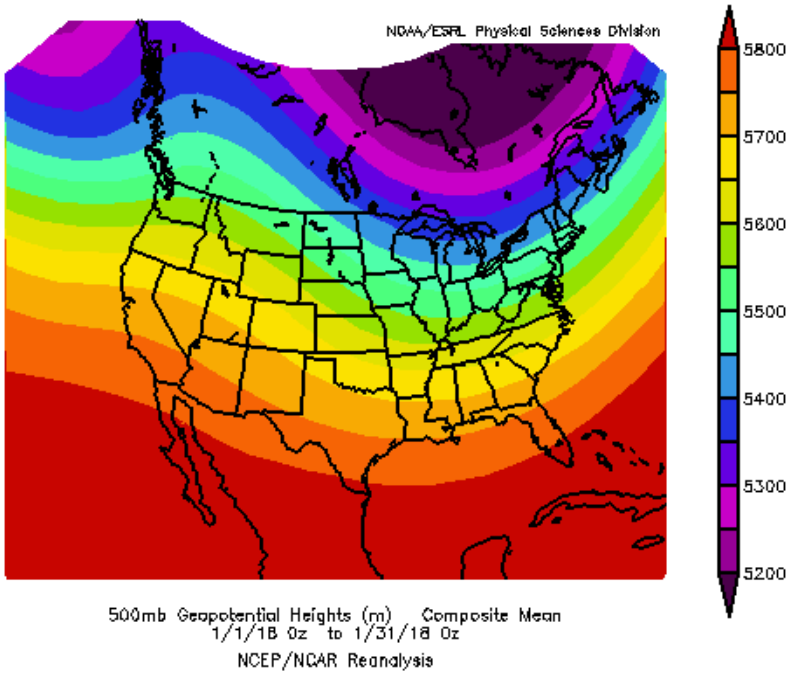


Comparing the January patterns.

Mean Atmospheric Pattern
January 1977



Mean Atmospheric Pattern
January 2018

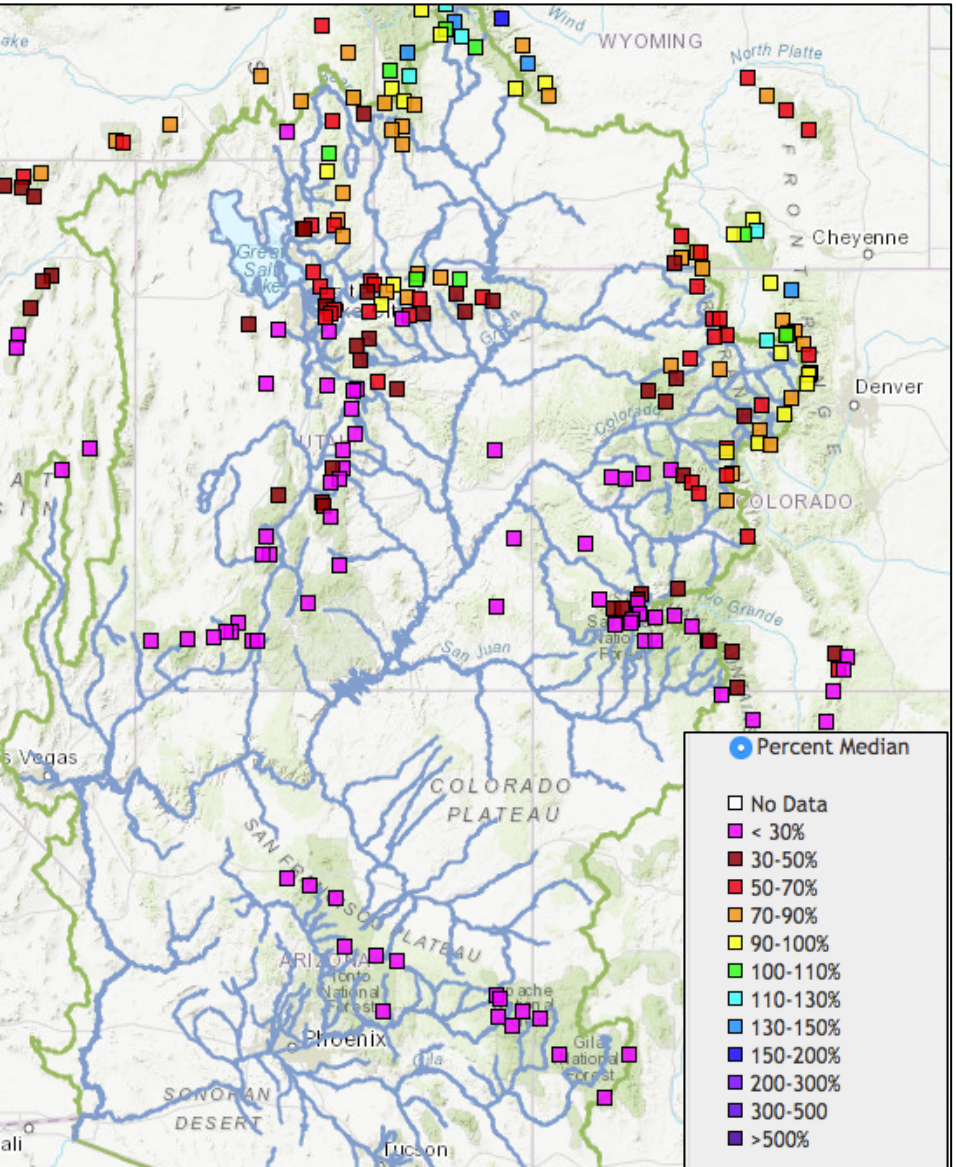


January 1977: Greater amplified ridge/trough developed the 2nd half of January and persisted through February.

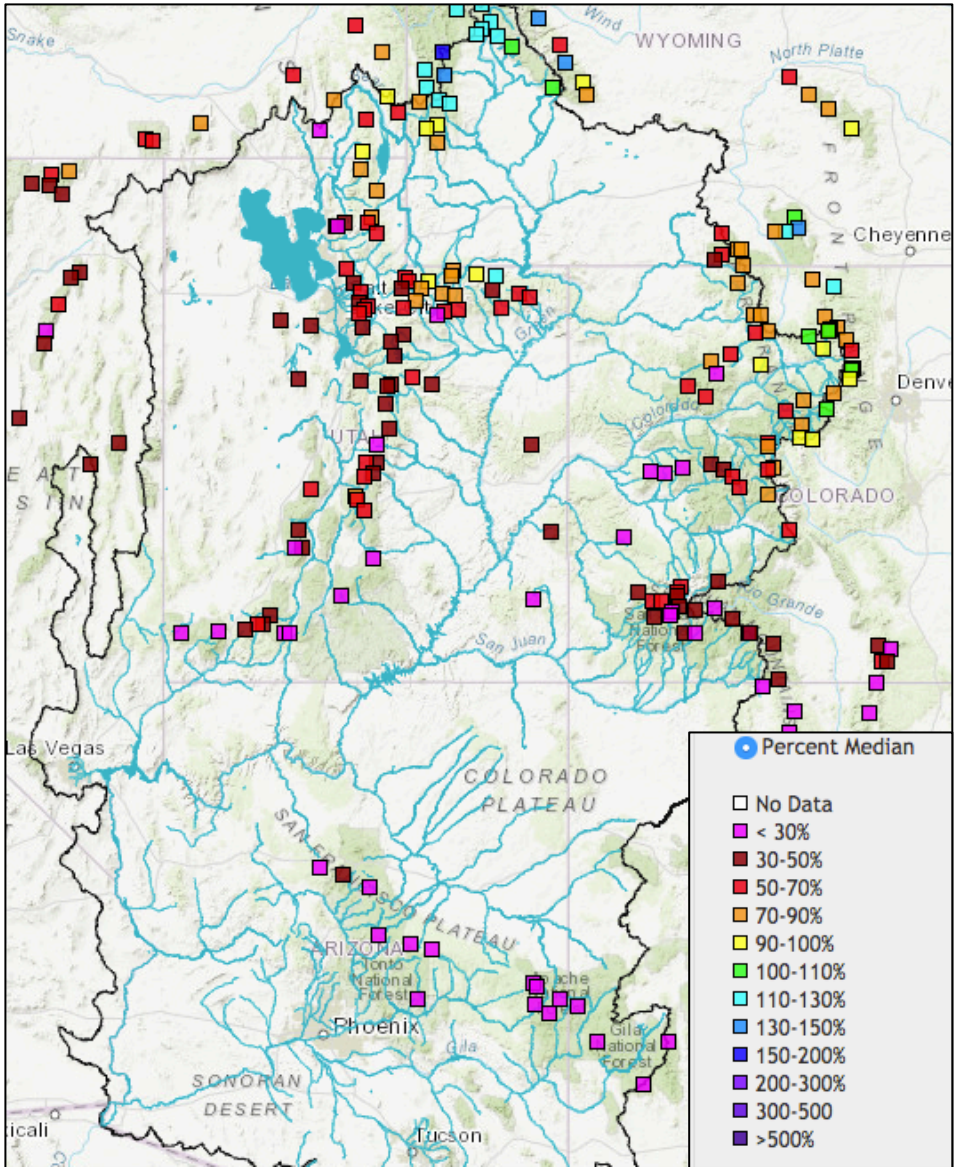
January 2018: High pressure ridge remains dominant player but the pattern has recently become more progressive in a northwest flow.

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

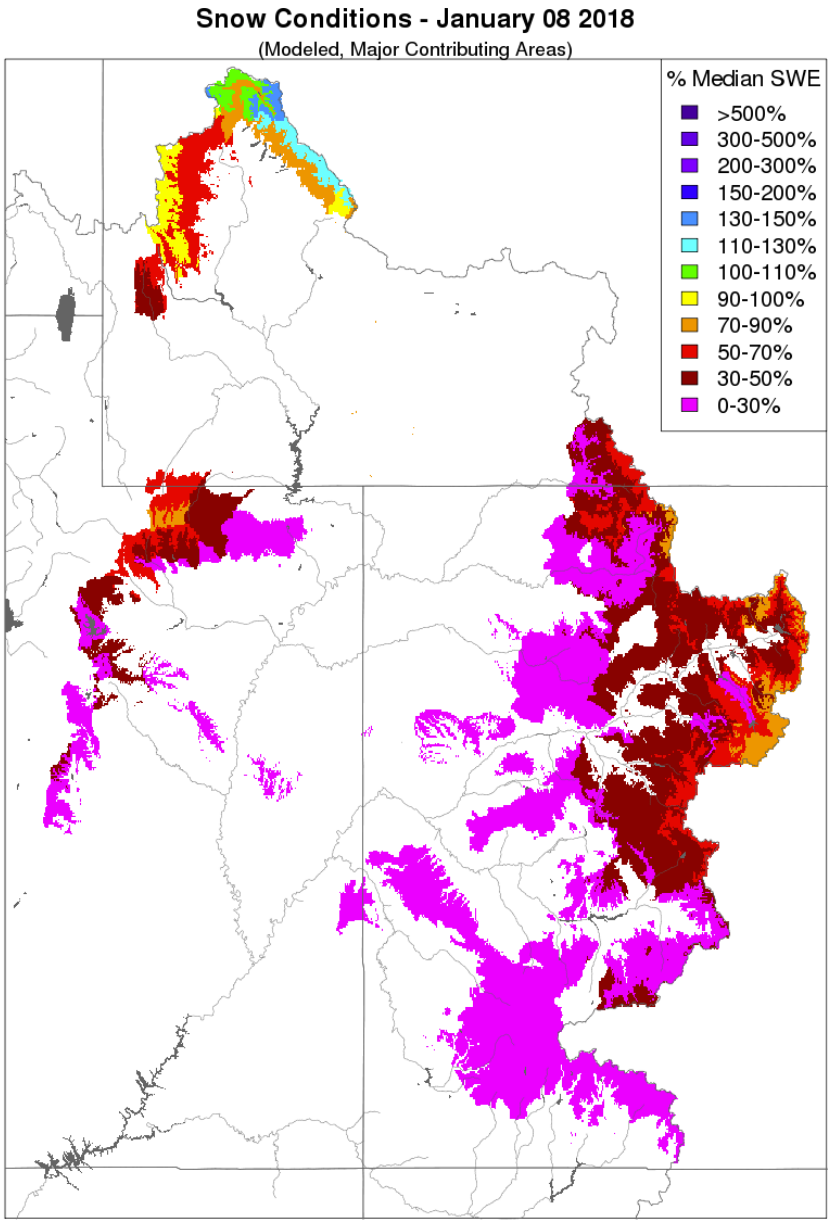
January 8th 2018

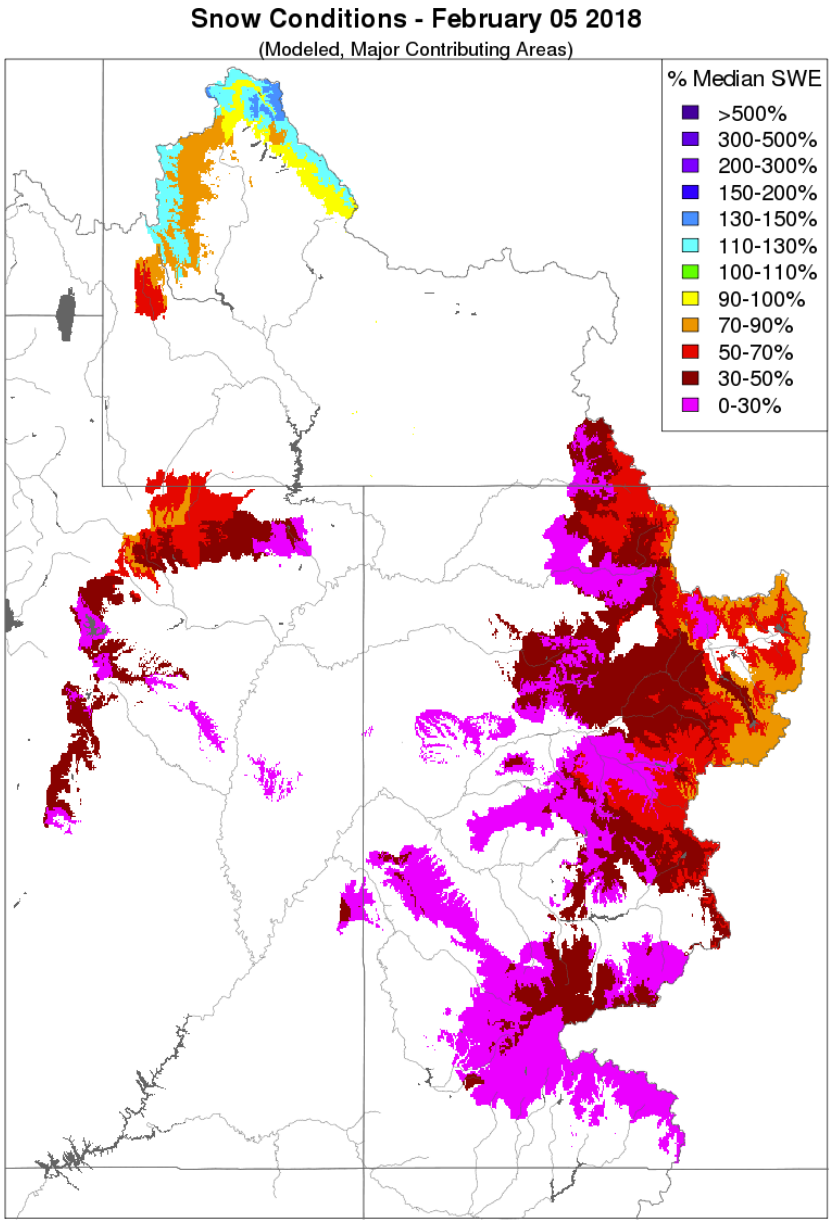


February 6th 2018



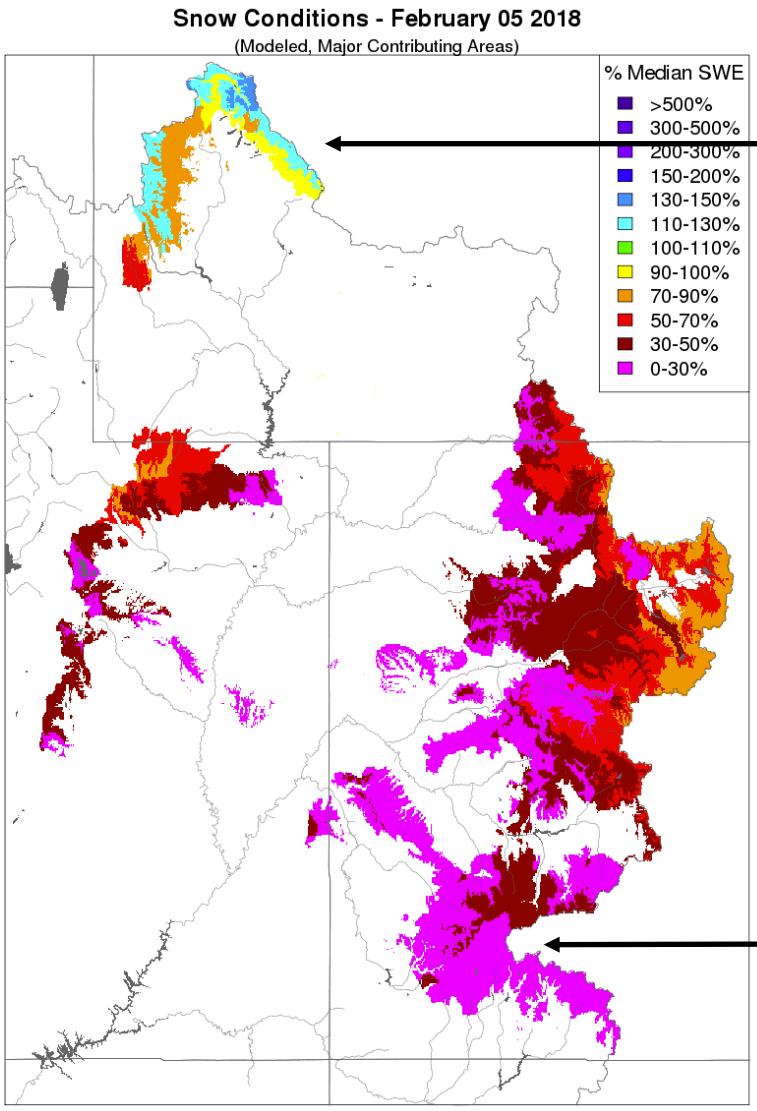
Snow Condition (as represented in the hydrologic model)

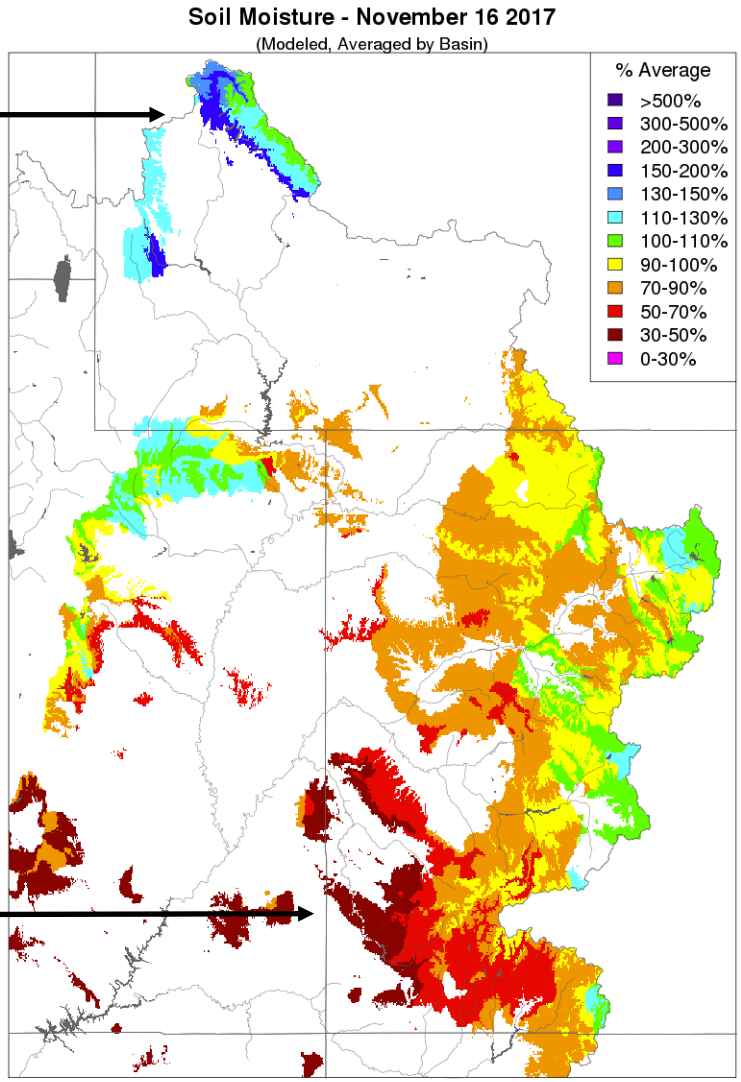




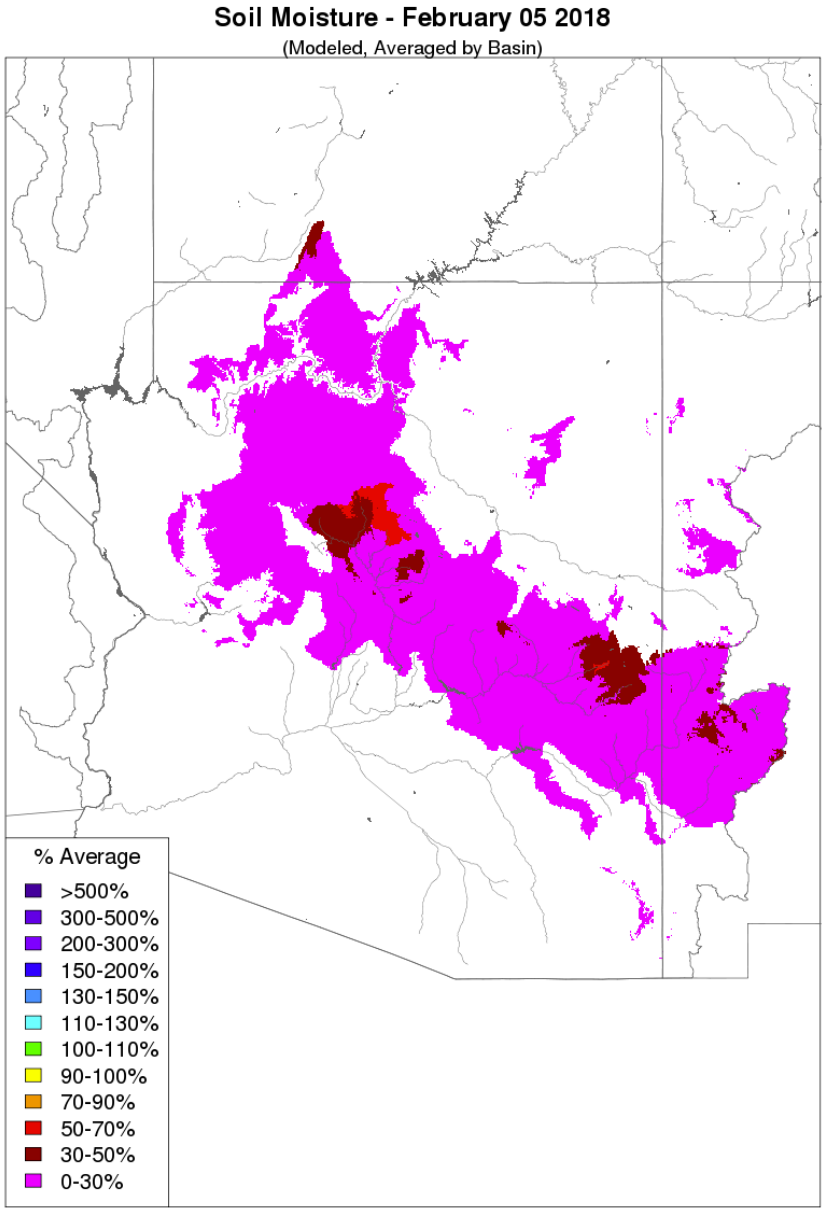
Soil Moisture Impacts (entering winter, prior to the onset of snow)

Where snowpack conditions and soil moisture show the same signal





Soil Moisture Impacts - Lower Colorado River Basin

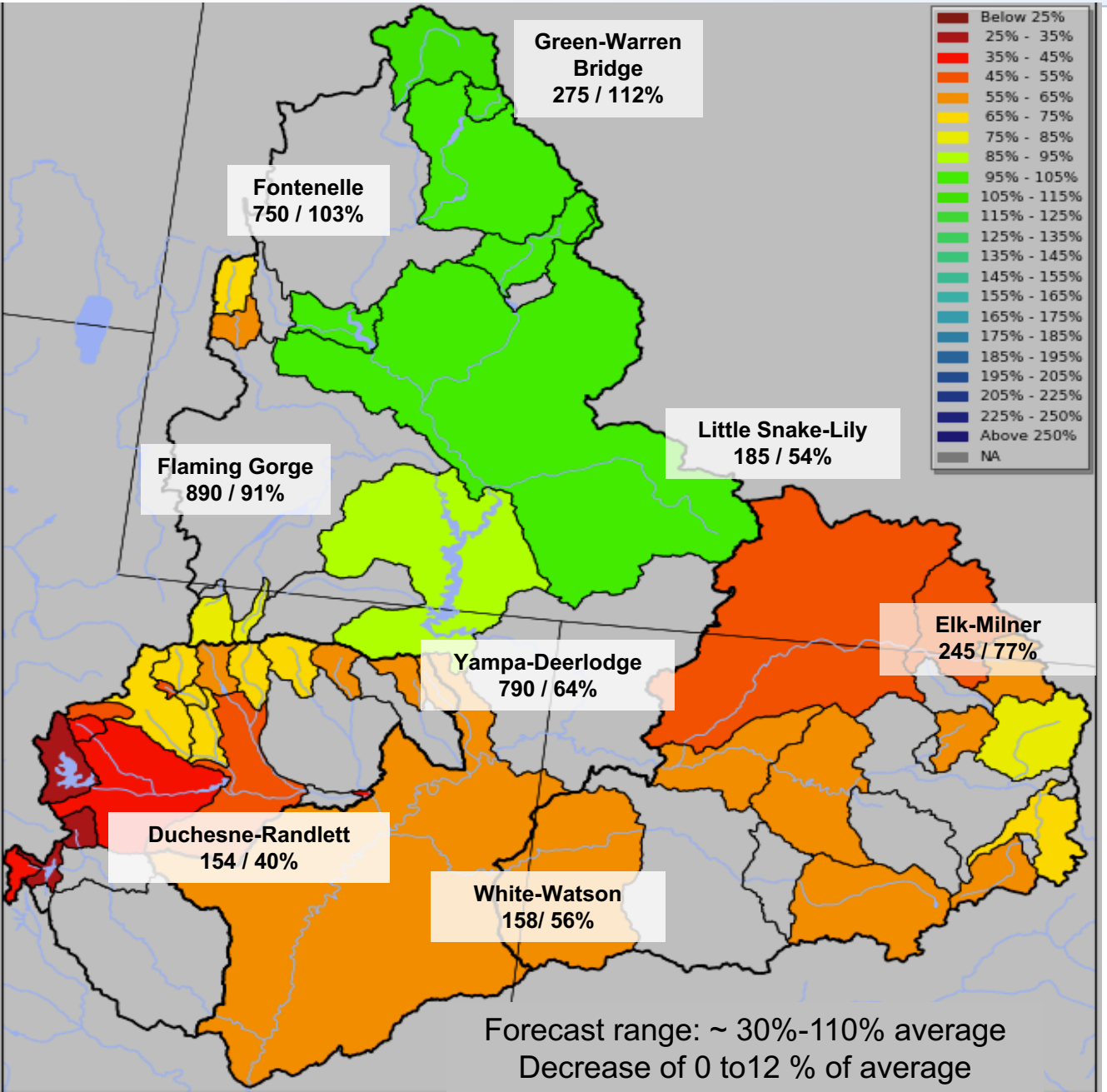


Below average precipitation dates back to August

Any precipitation events are unlikely to product significant runoff initially

Snowmelt likely absorbed into the soil

Upper Colorado: Green-Yampa-White-Duchesne

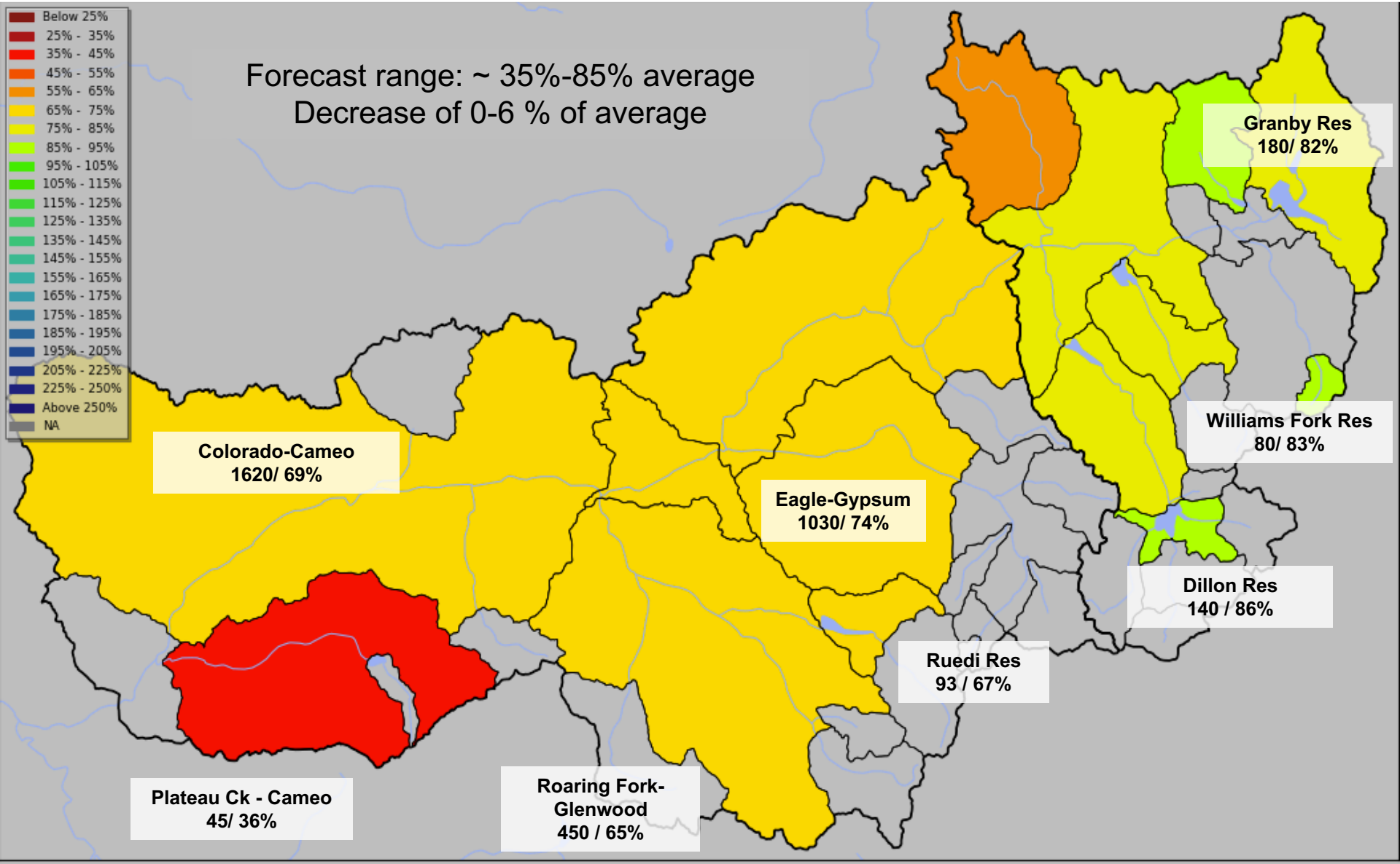


Forecasts as of Feb 1 2018

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

Upper Colorado: Colorado River Mainstem

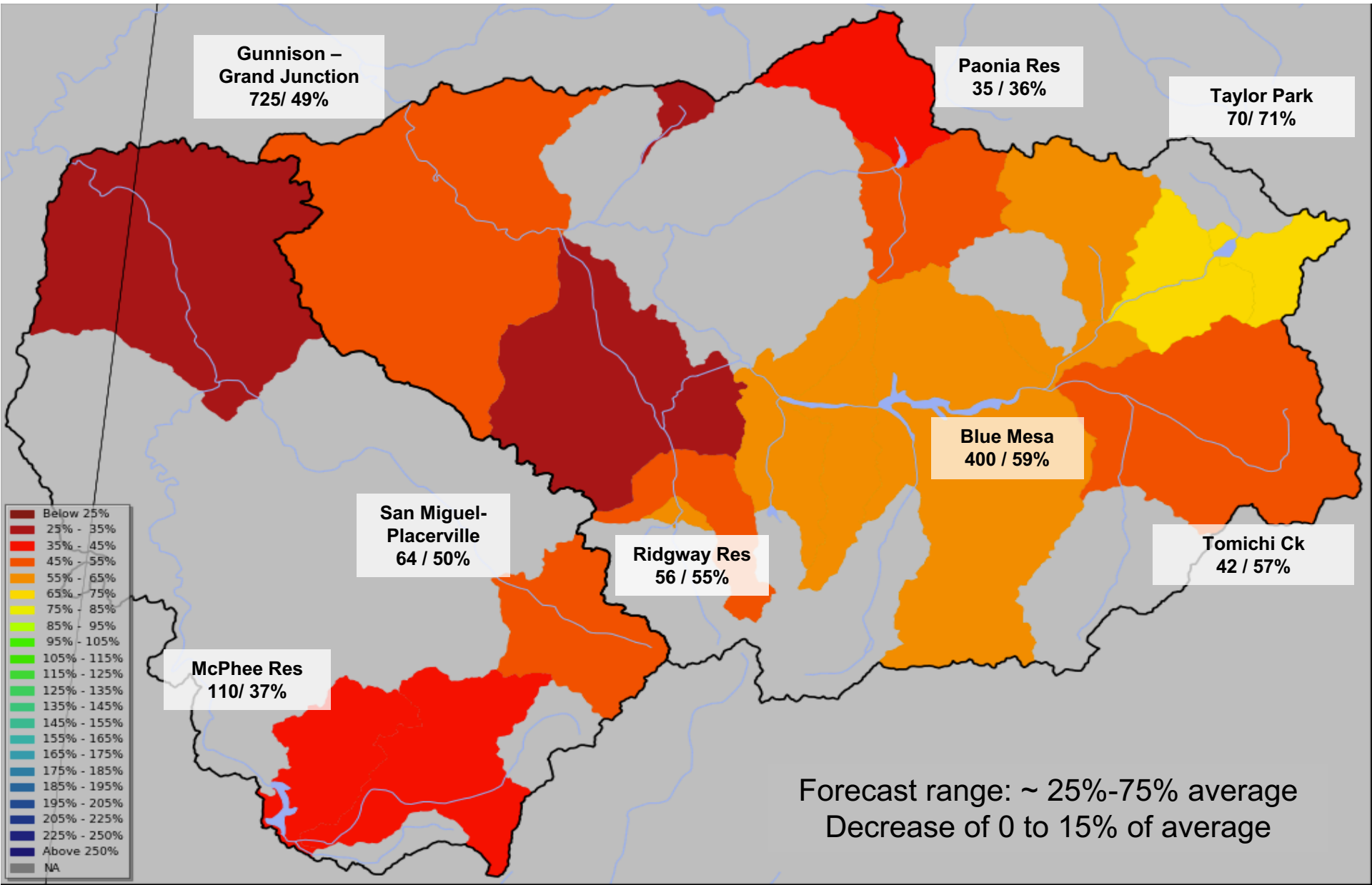
Forecasts as of Feb 1 2018
Volume in 1000's acre-feet / % of 1981-2010 average



Upper Colorado: Gunnison and Dolores Basins

Forecasts as of Feb 1 2018

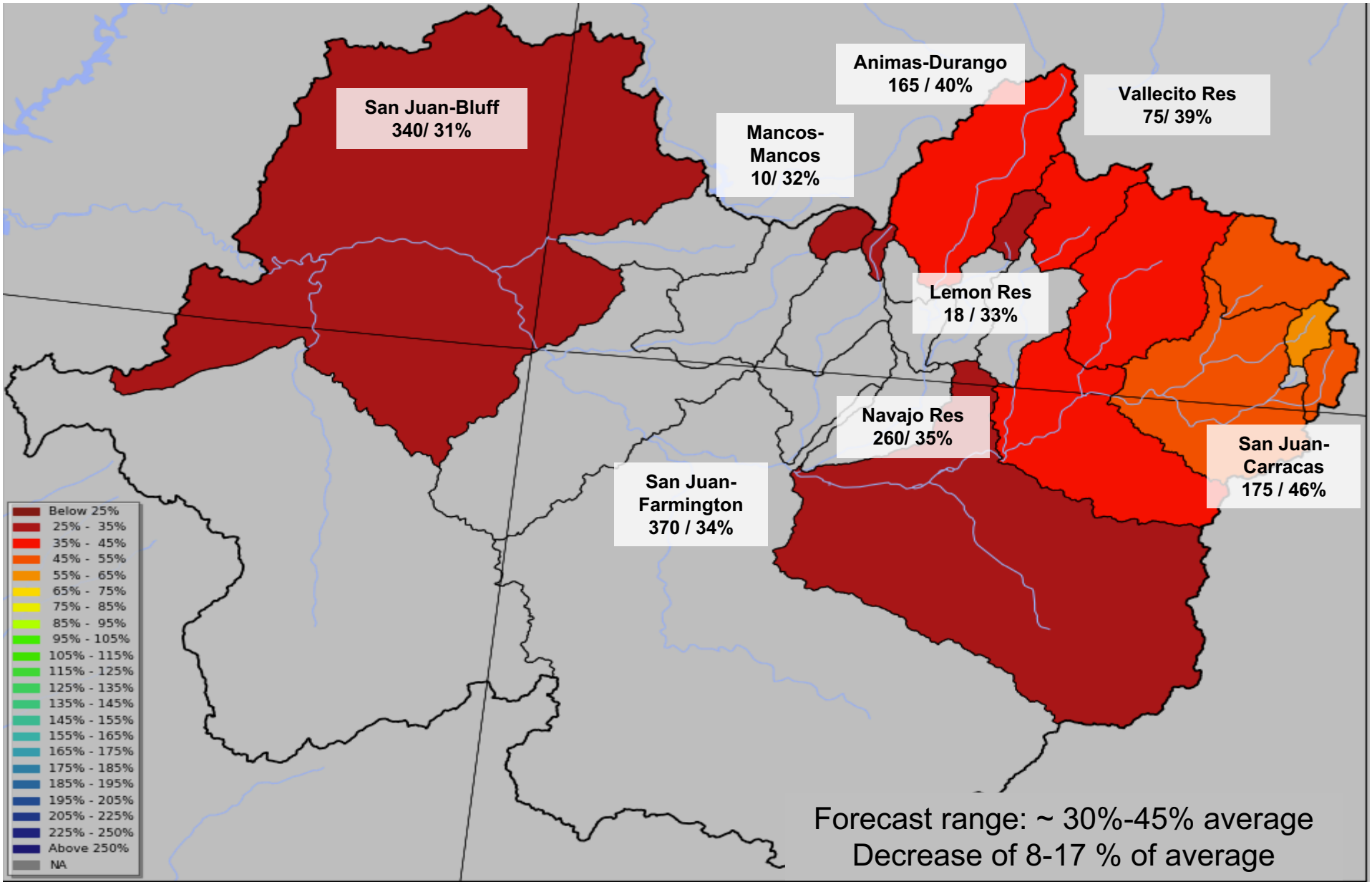
Volume in 1000's acre-feet / % of 1981-2010 average

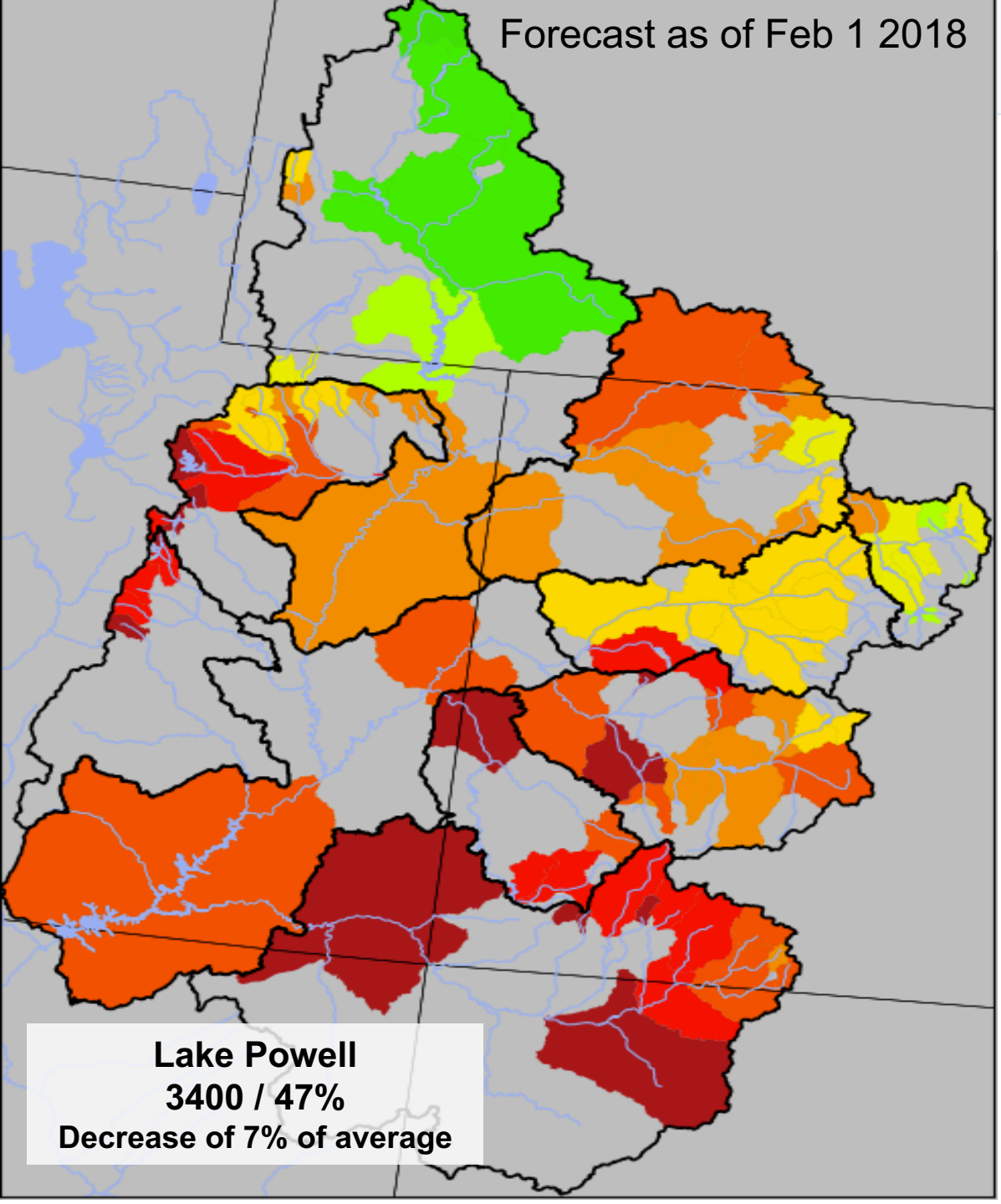


Upper Colorado: San Juan Basin

Forecasts as of Feb 1 2018

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





Upper Colorado April-July Streamflow Volume Forecasts

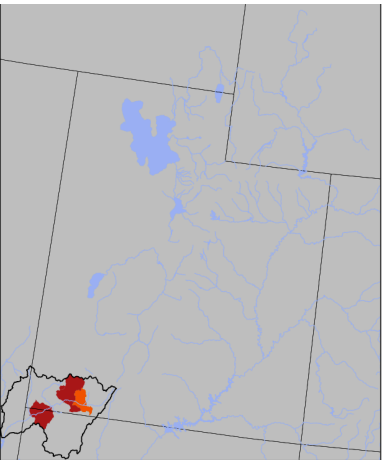
(% of 1981-2010 average)

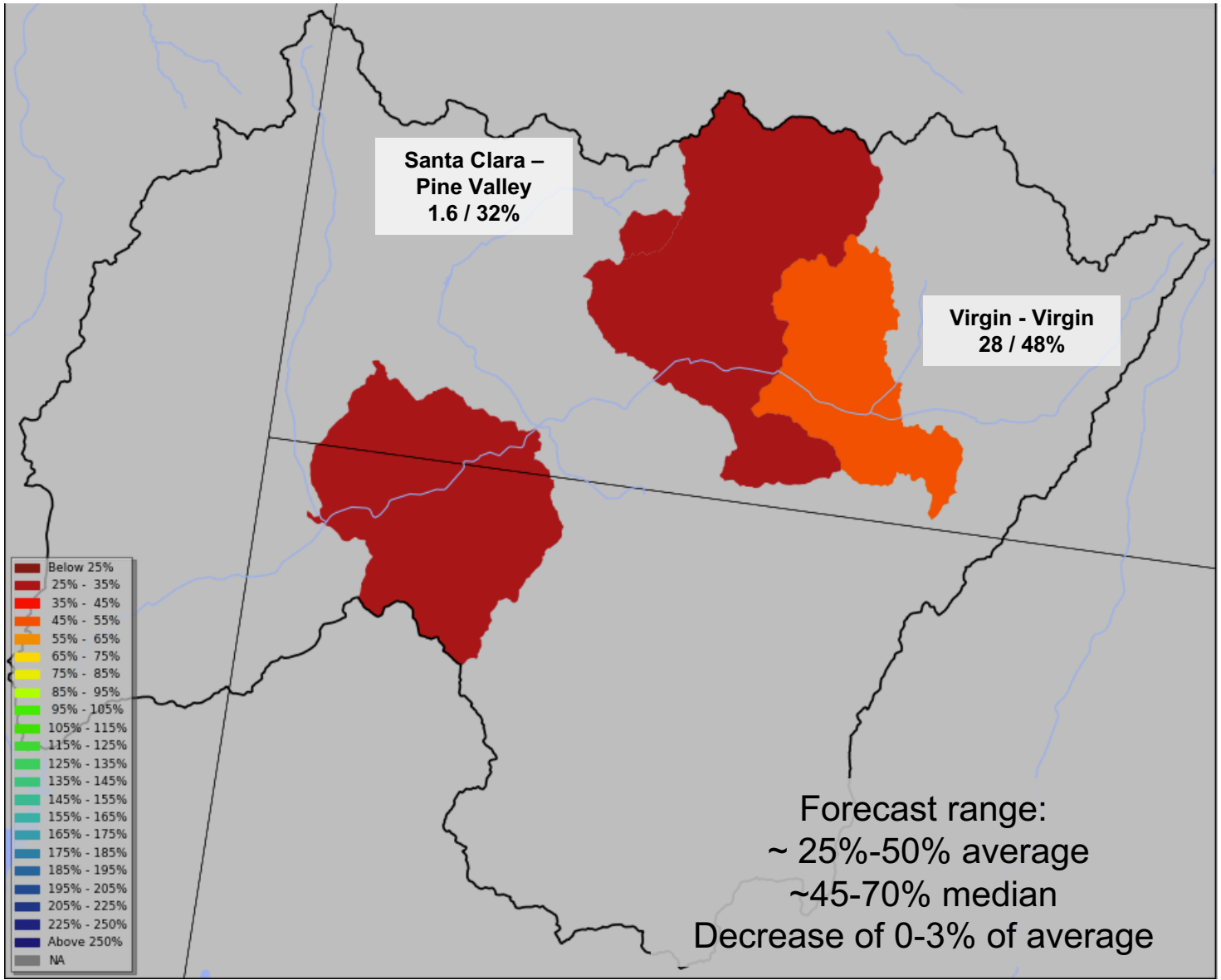
Lake Powell:
3400 KAF / 47 % average

- 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

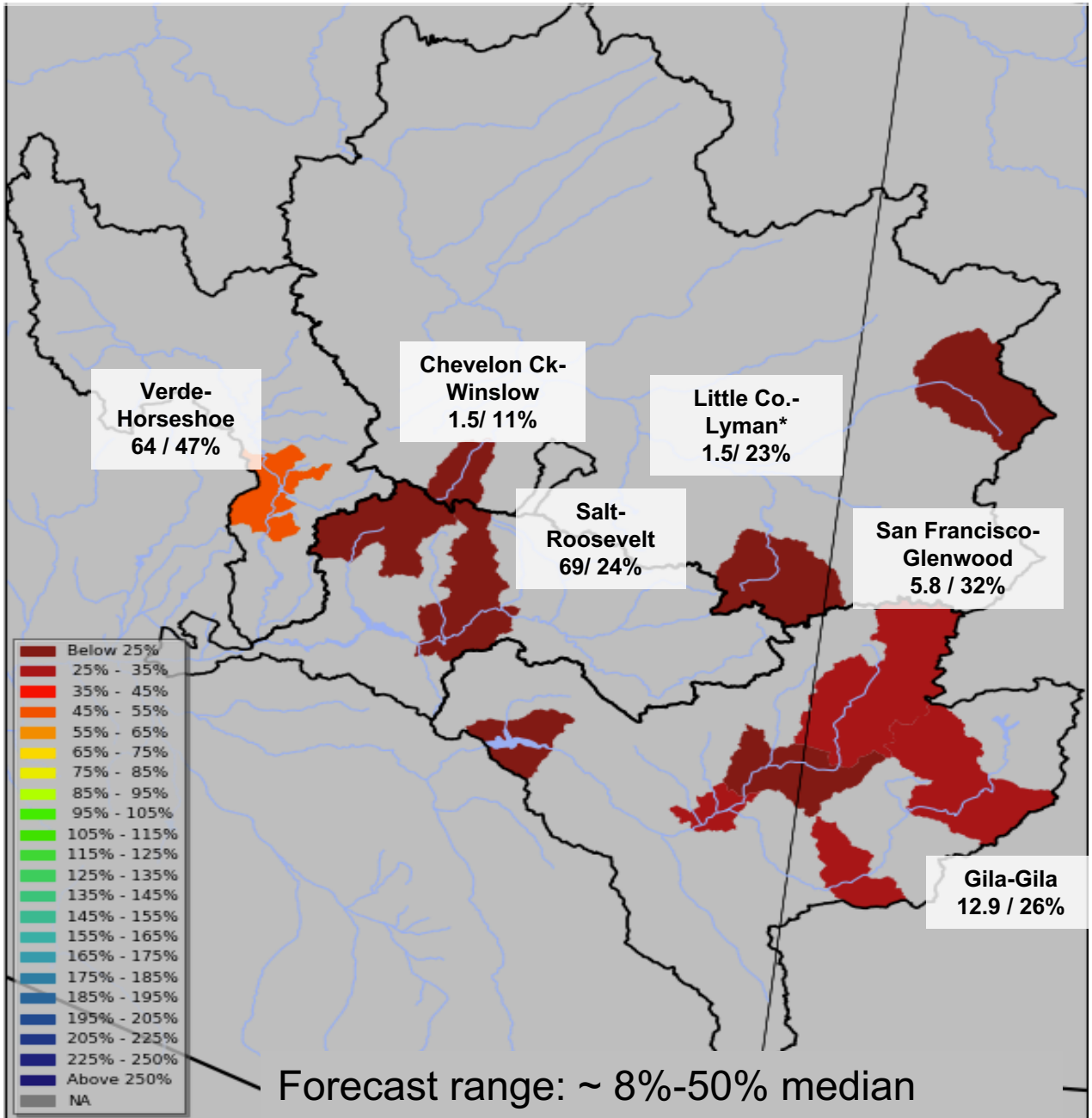
Lower Colorado (Virgin River) April-July Streamflow Volume Forecasts

Forecasts as of Feb 1 2018



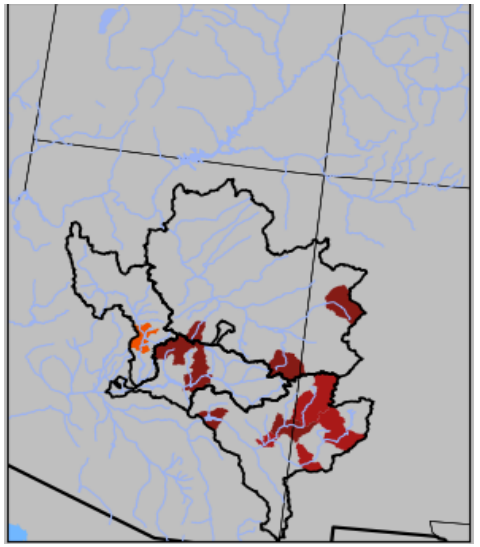


Lower Colorado Feb-May forecast streamflow volumes (1000's acre-feet / % of 1981-2010 median)



Forecast range: ~ 8%-50% median

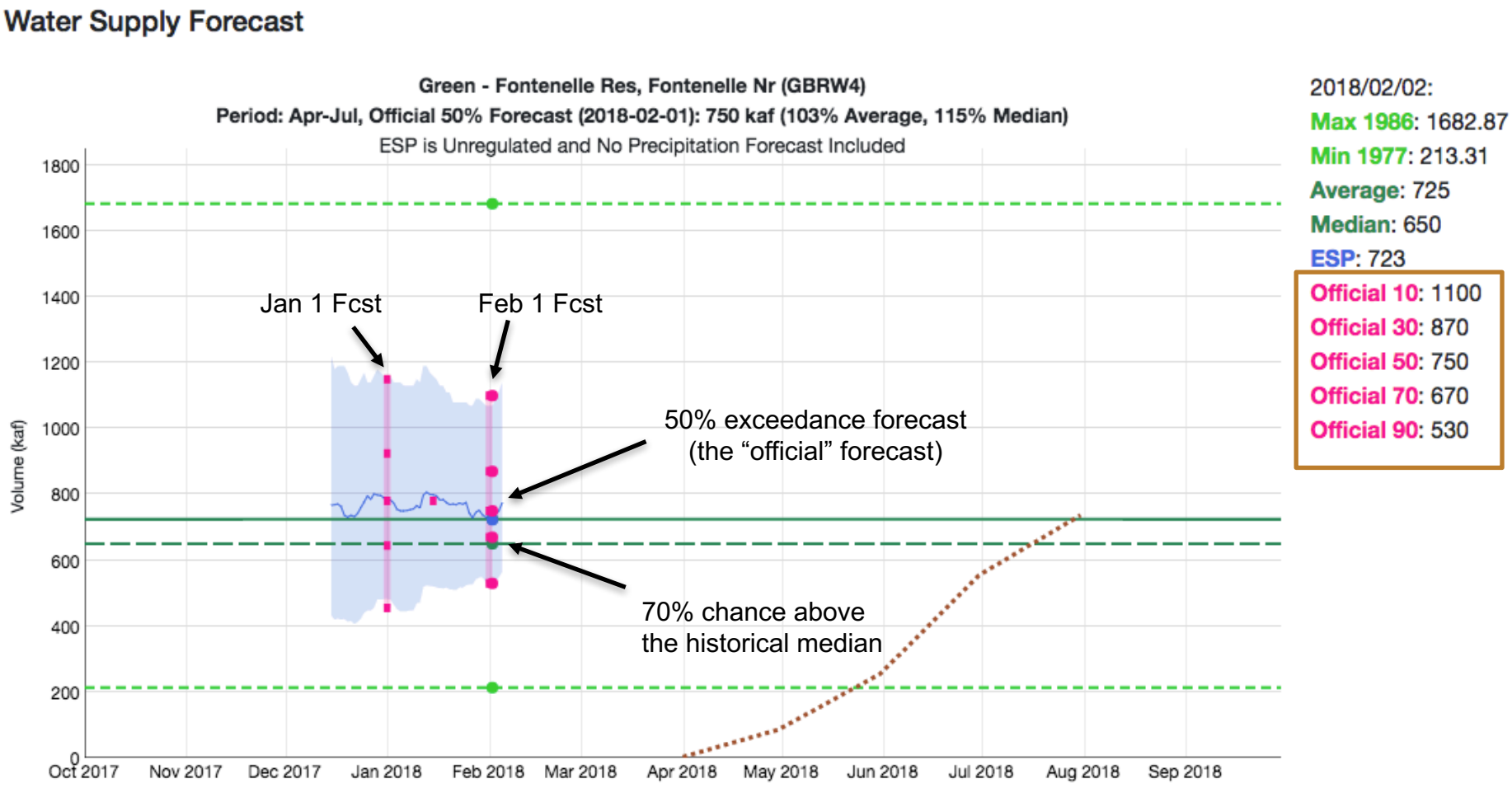
Forecasts as of
Feb 1 2018



* Feb-June forecast period

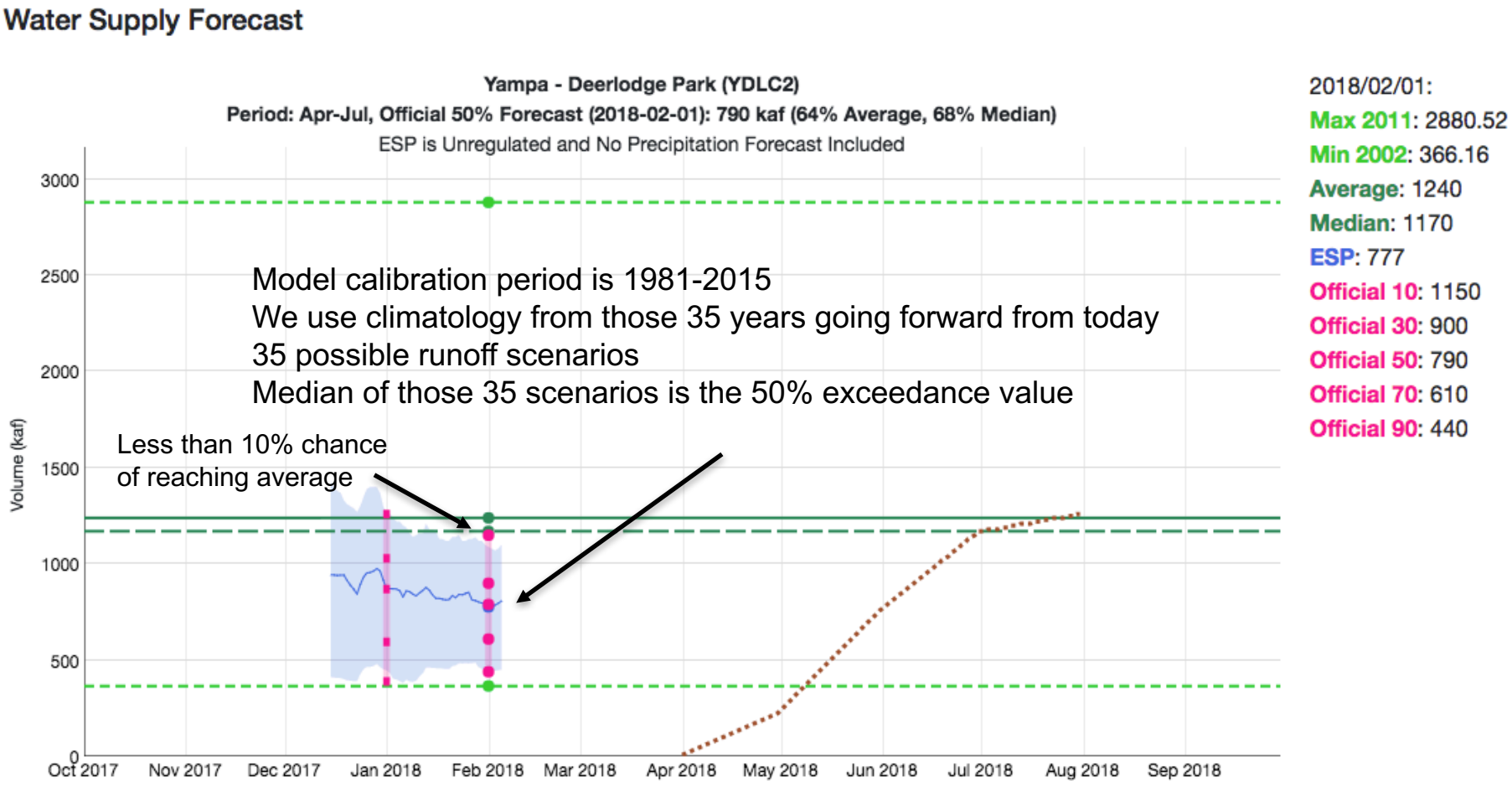
Forecast Evolution Plot: Fontenelle Reservoir Inflow

Forecast: 103 % of average



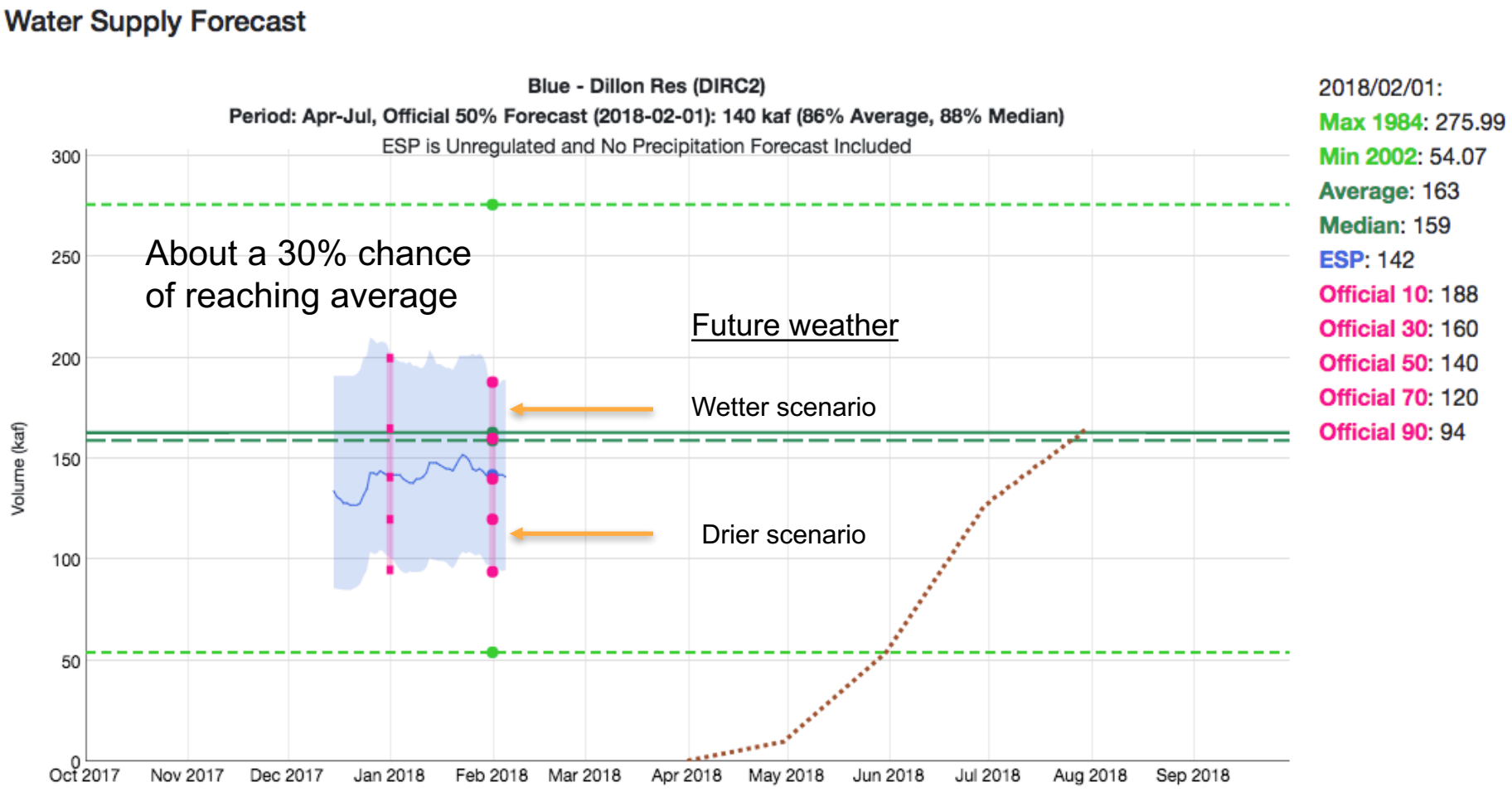
Forecast Evolution Plot: Yampa River @ Deerlodge

Forecast 64% of average



Forecast Evolution Plot: Dillon Reservoir Inflow

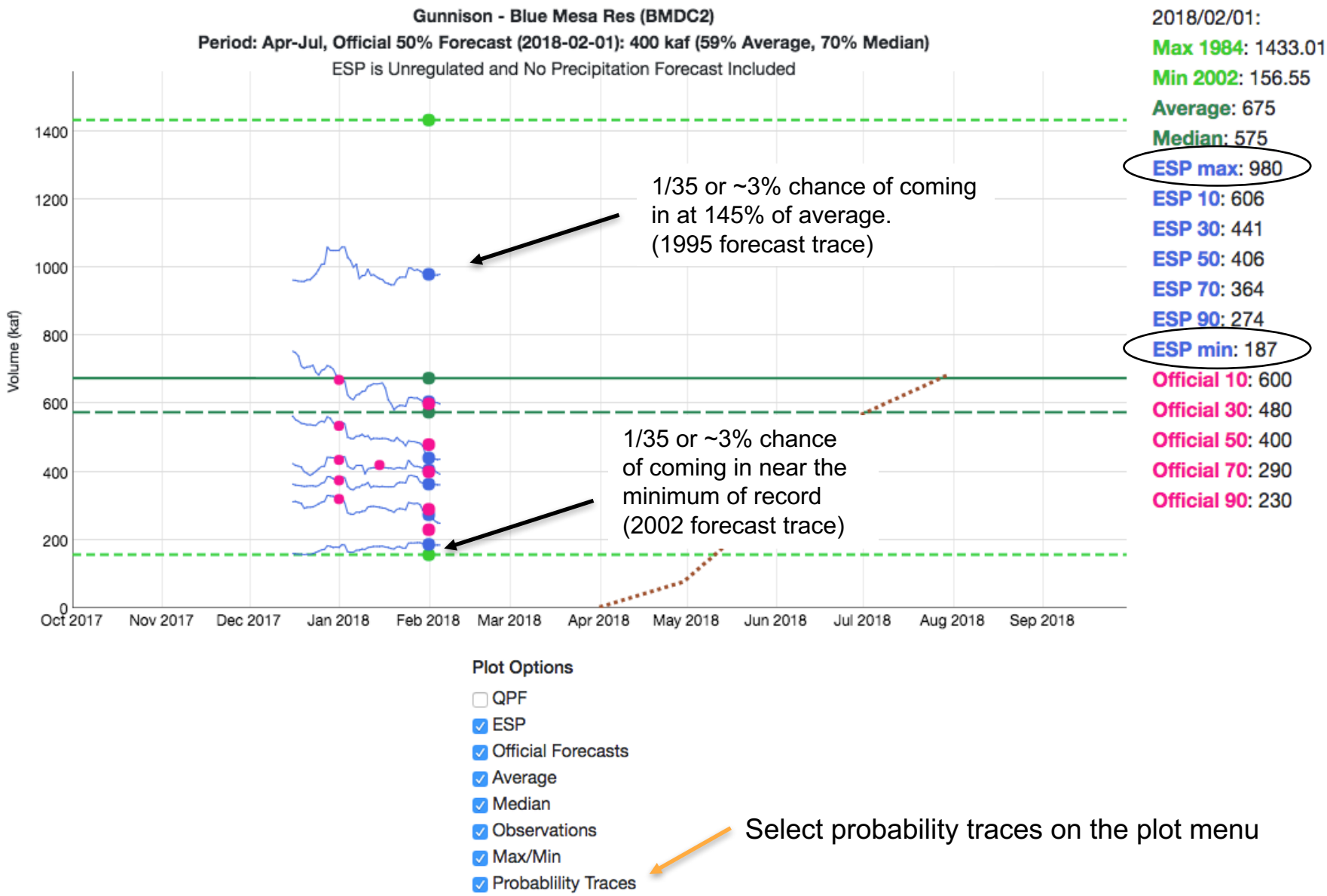
Forecast 86% of average



Forecast Evolution Plot: Blue Mesa Reservoir Inflow

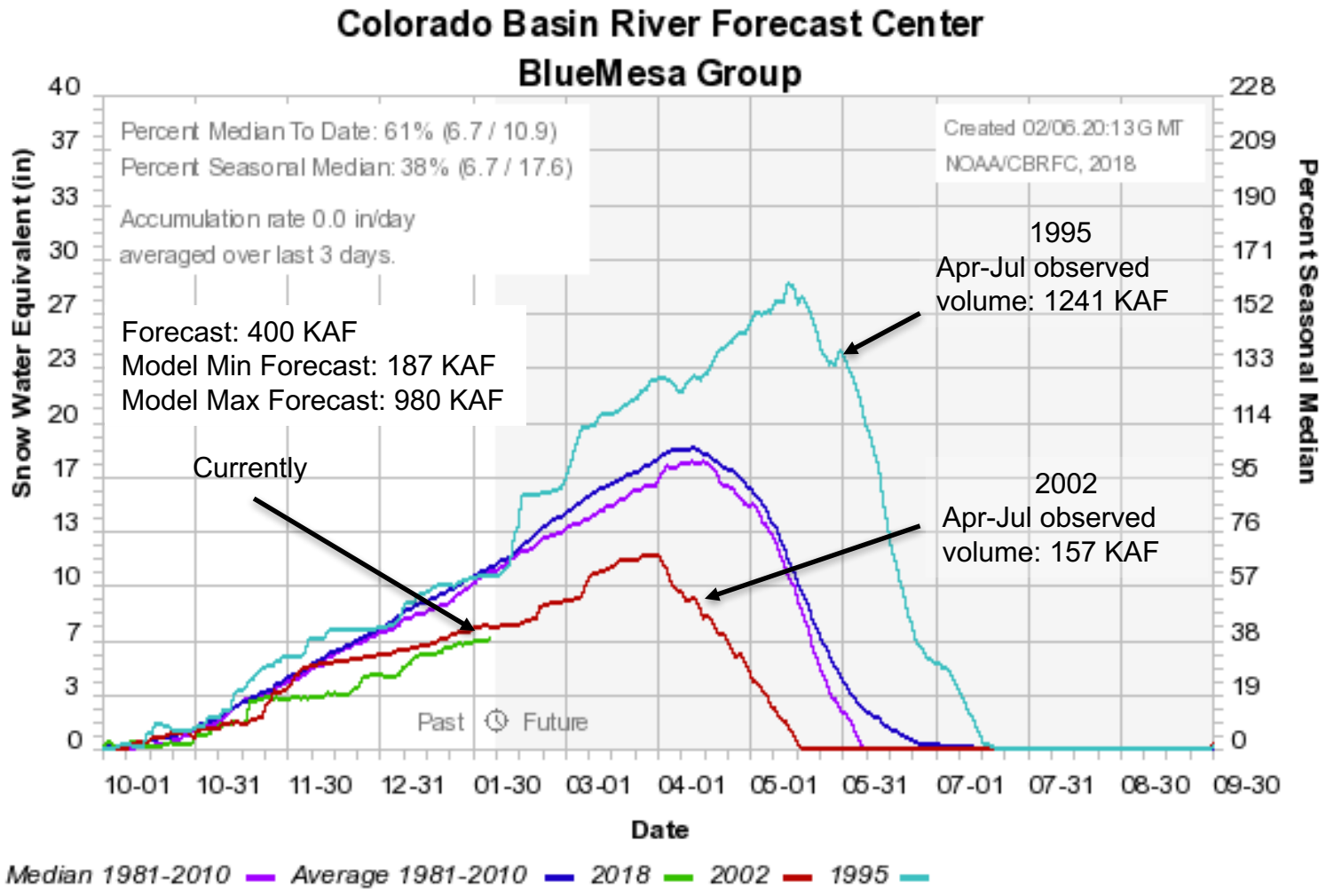
Water Supply Forecast

Forecast 59% of average



Select probability traces on the plot menu

Blue Mesa Reservoir Inflow – What happened in those max/min years .

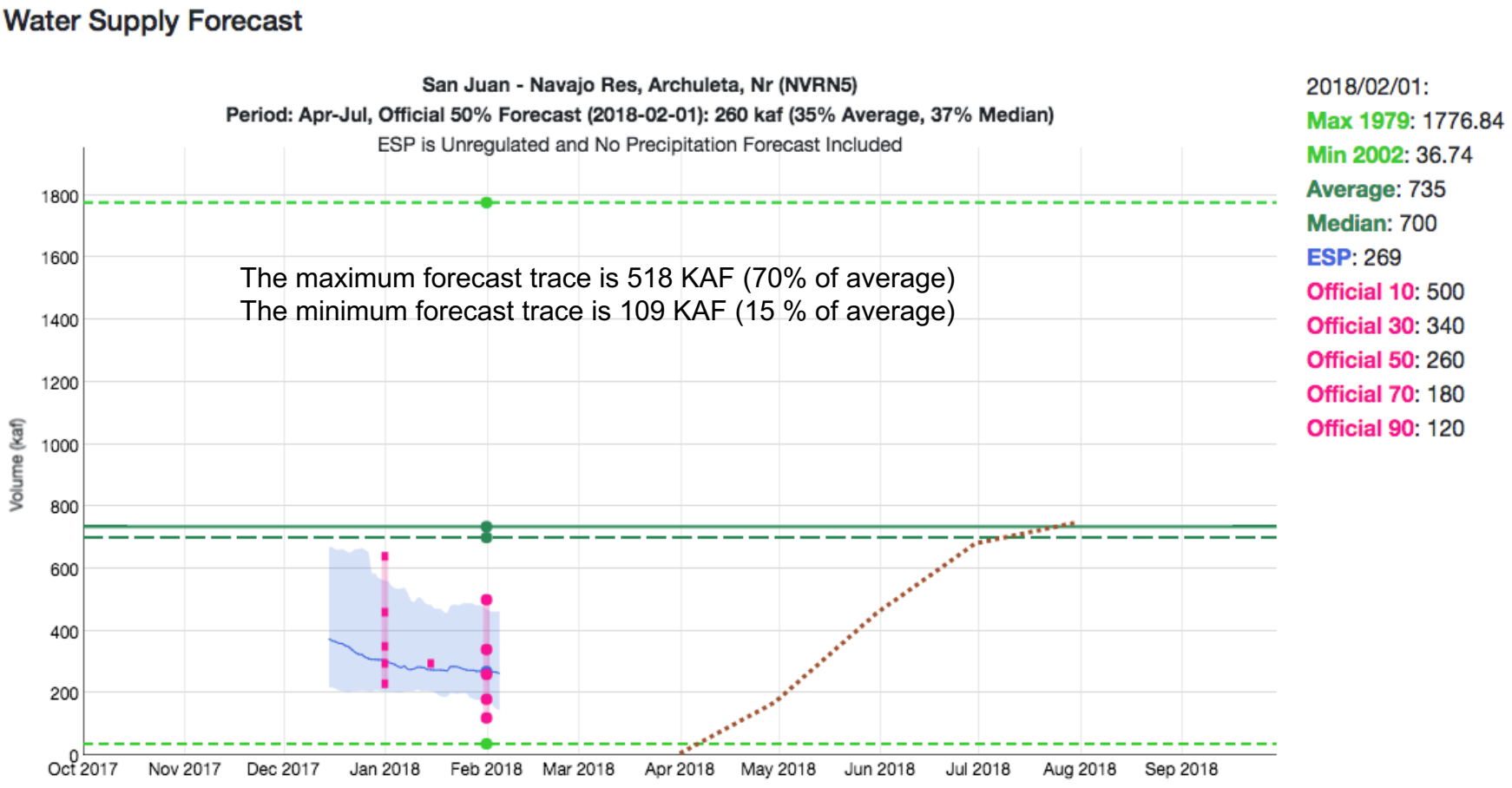


You might ask: Why doesn't a 2002 scenario from this point on end up as a record minimum?

- Current conditions matter (2002 had lower base flow and soil moisture entering season)
- Model forecast error in February is higher than in future months

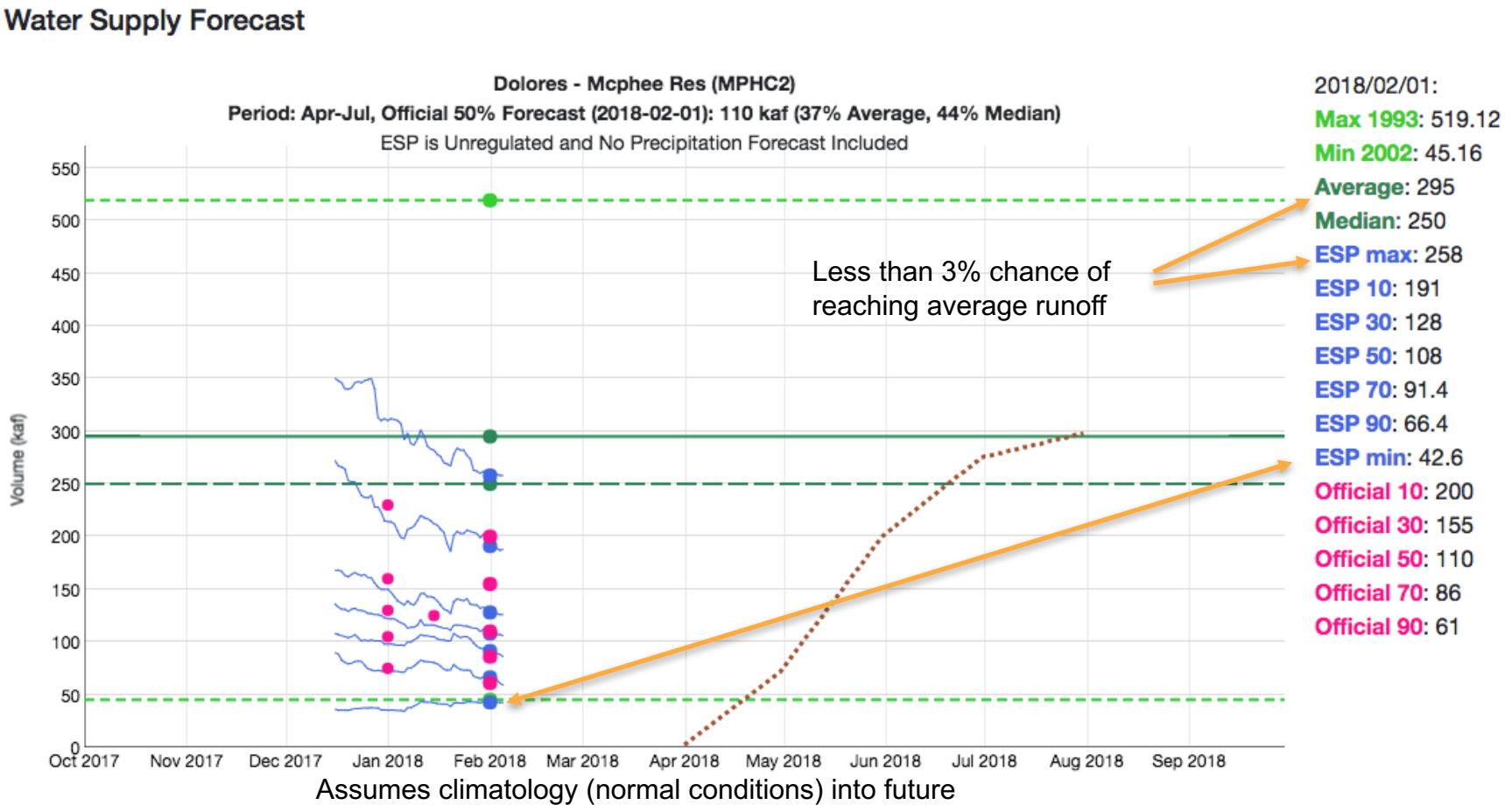
Forecast Evolution Plot: Navajo Reservoir Inflow

Forecast 35% of average



Forecast Evolution Plot: McPhee Reservoir Inflow

Forecast 37% of average

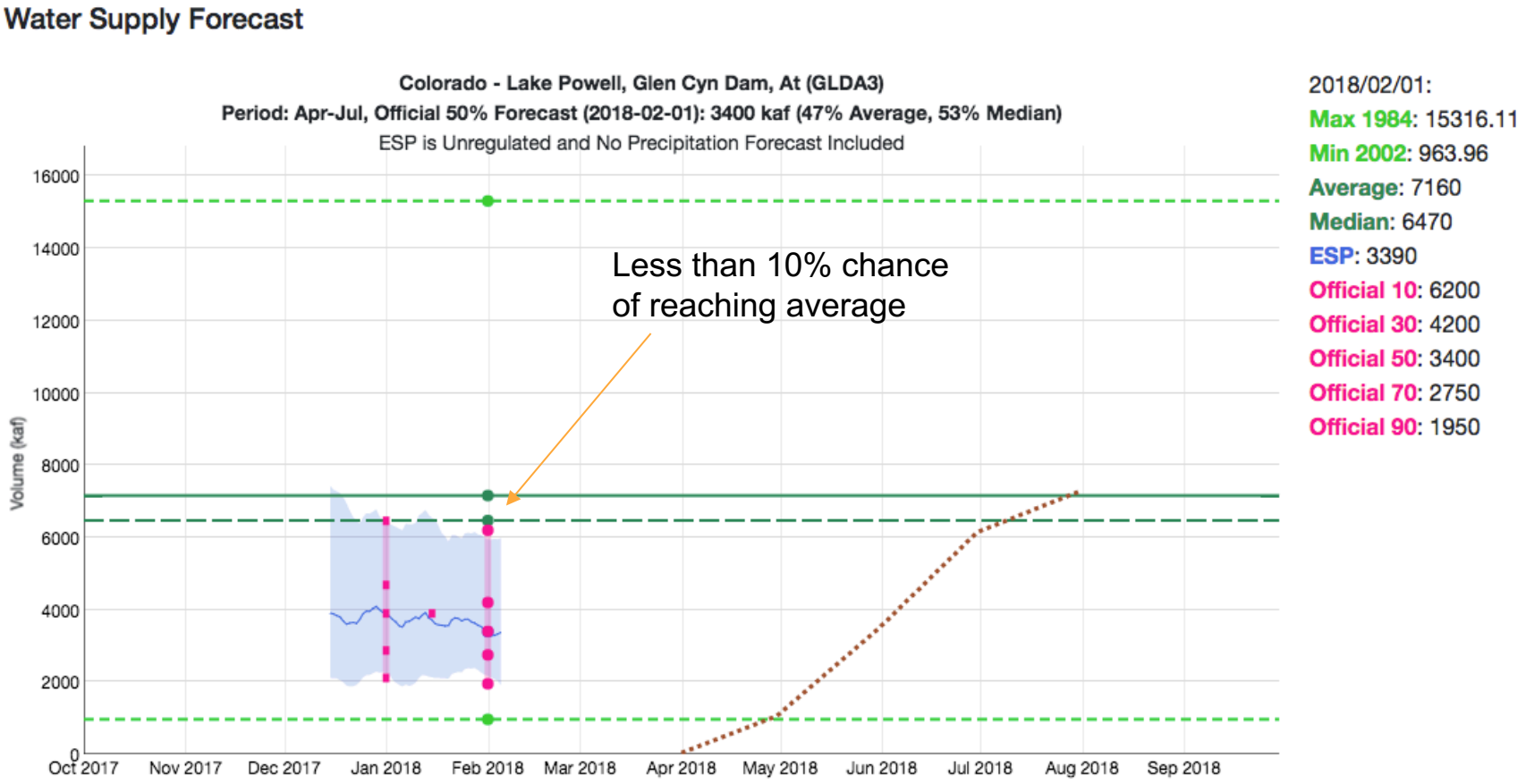


Assumes climatology (normal conditions) into future

Forecast Evolution Plot: Lake Powell Inflow

47% of Average

Current forecast is 7th lowest in 54 years of record



Forecast Validation: Historical model error improves January to February

Historical Model Error 1981-2010

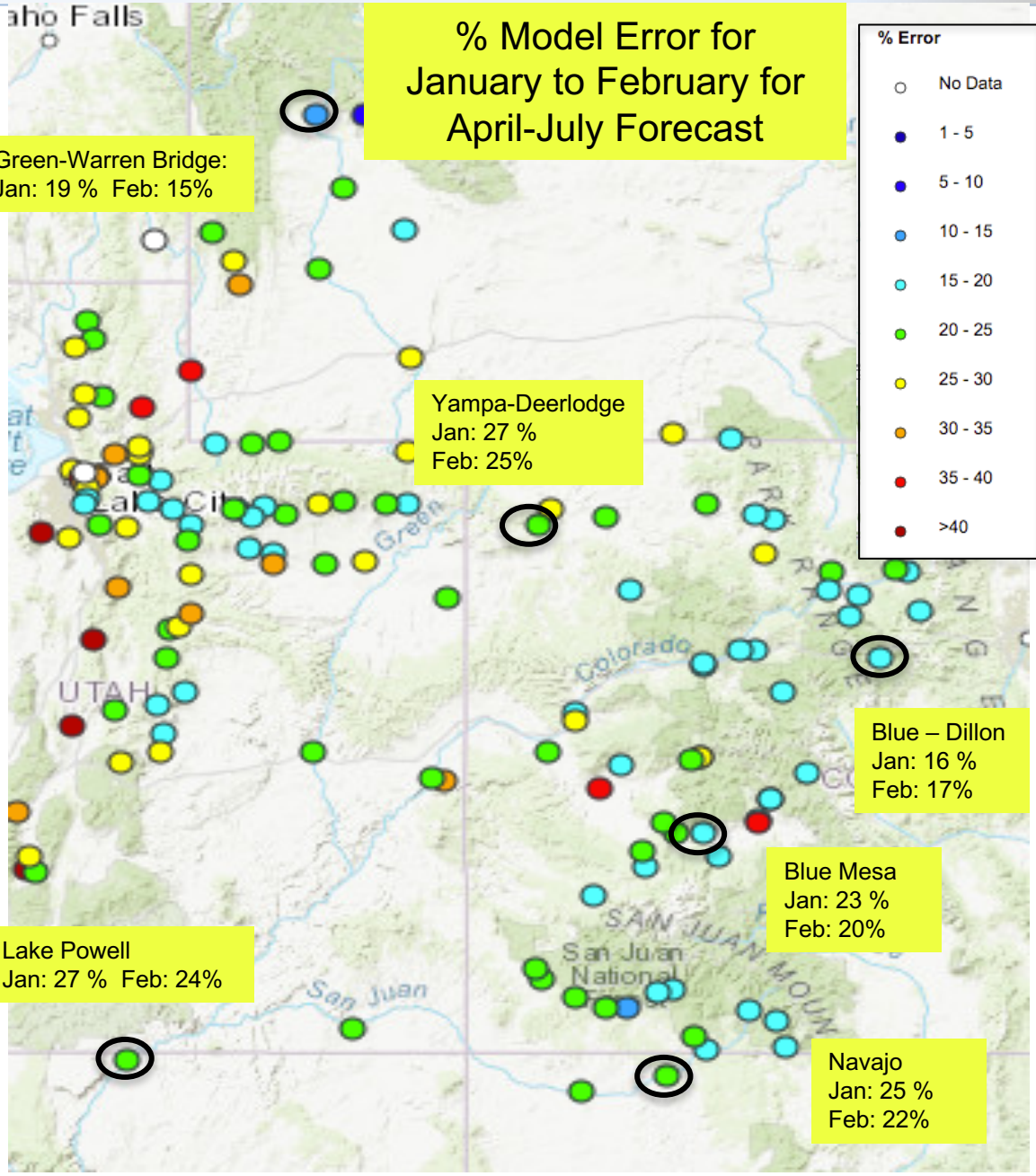
Generally improvement in model mean absolute forecast error between January and February

Forecasts are better than just going with average

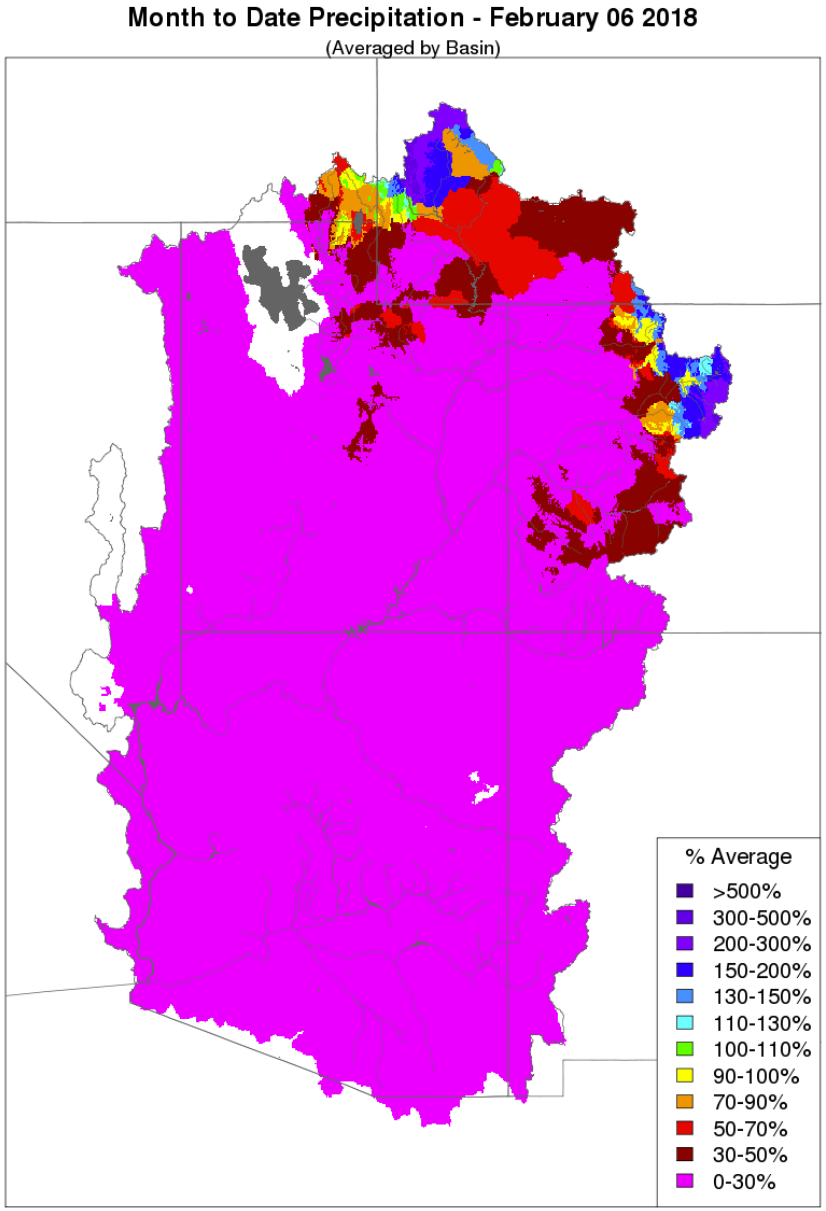
Error tends to decrease each month into the spring

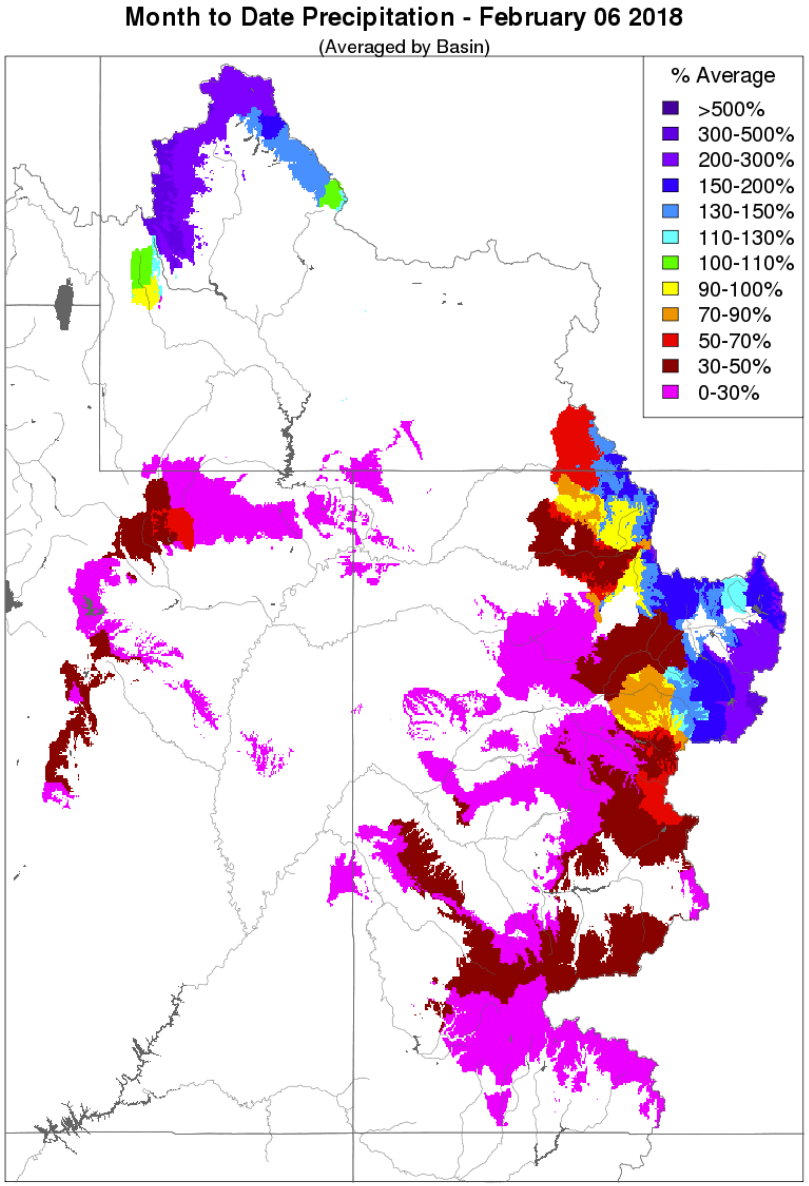
Where We Do Better:
- Headwaters
- Primarily snow melt basins
- Known diversions / demands

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

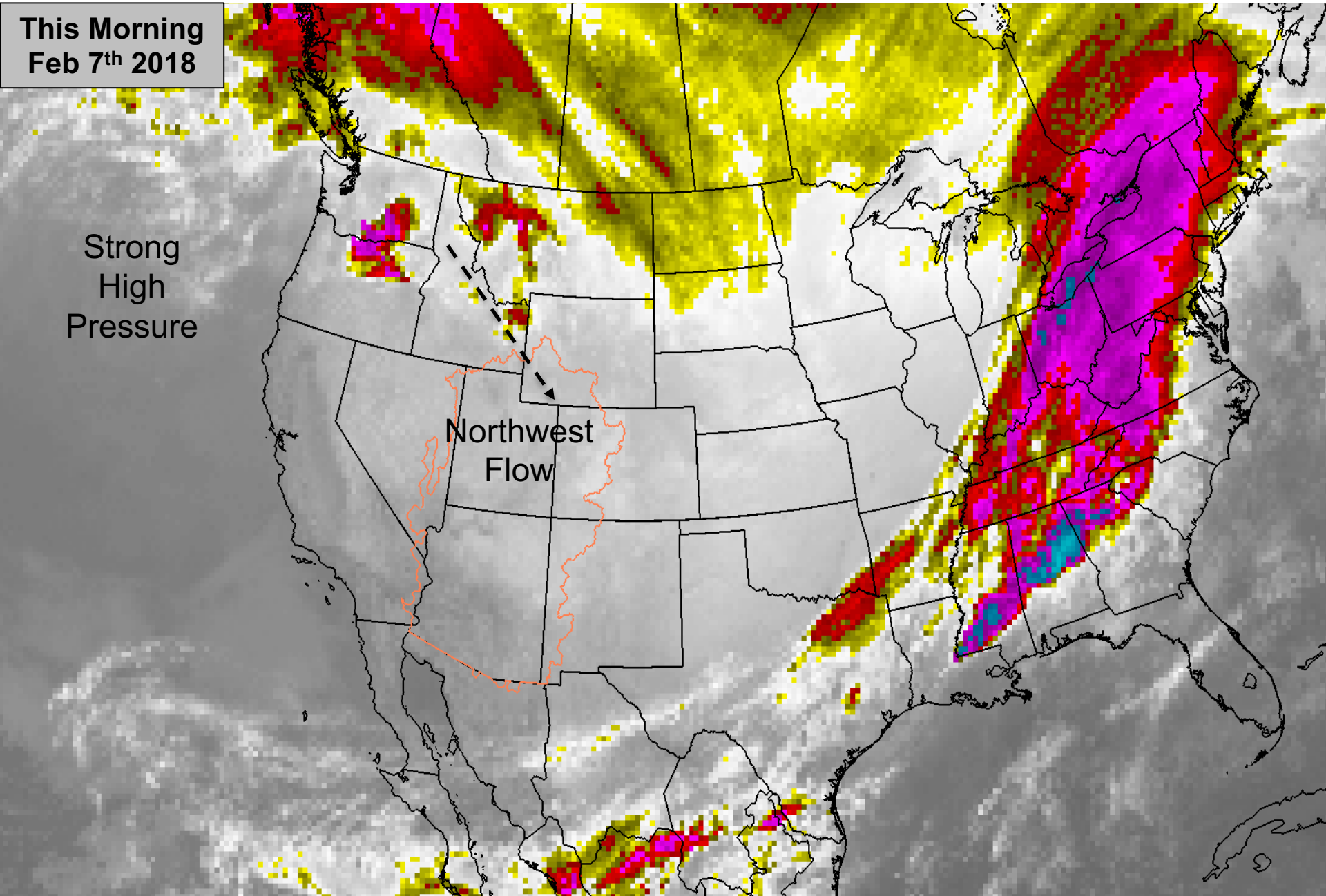


February Precipitation
(first 6 days)

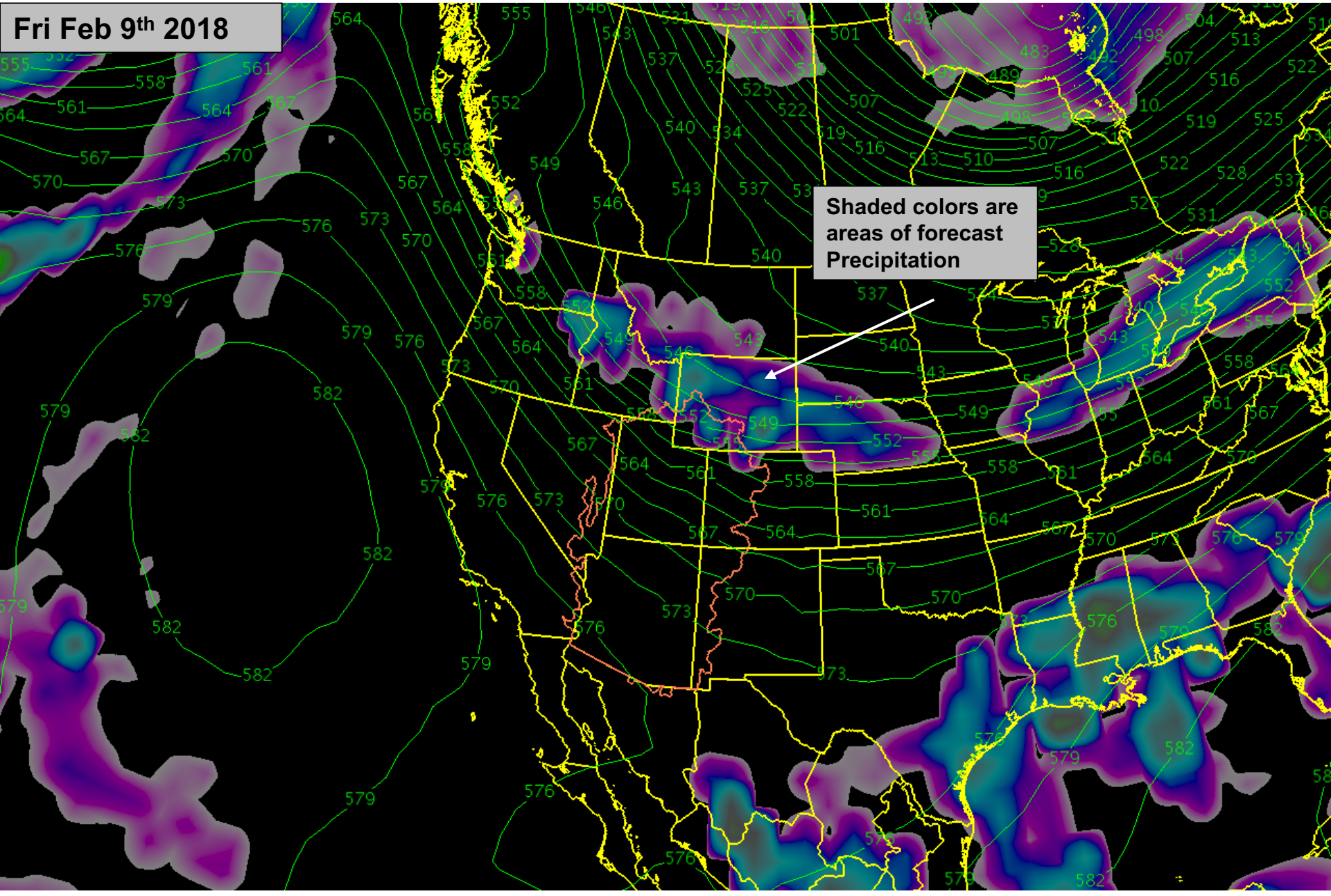




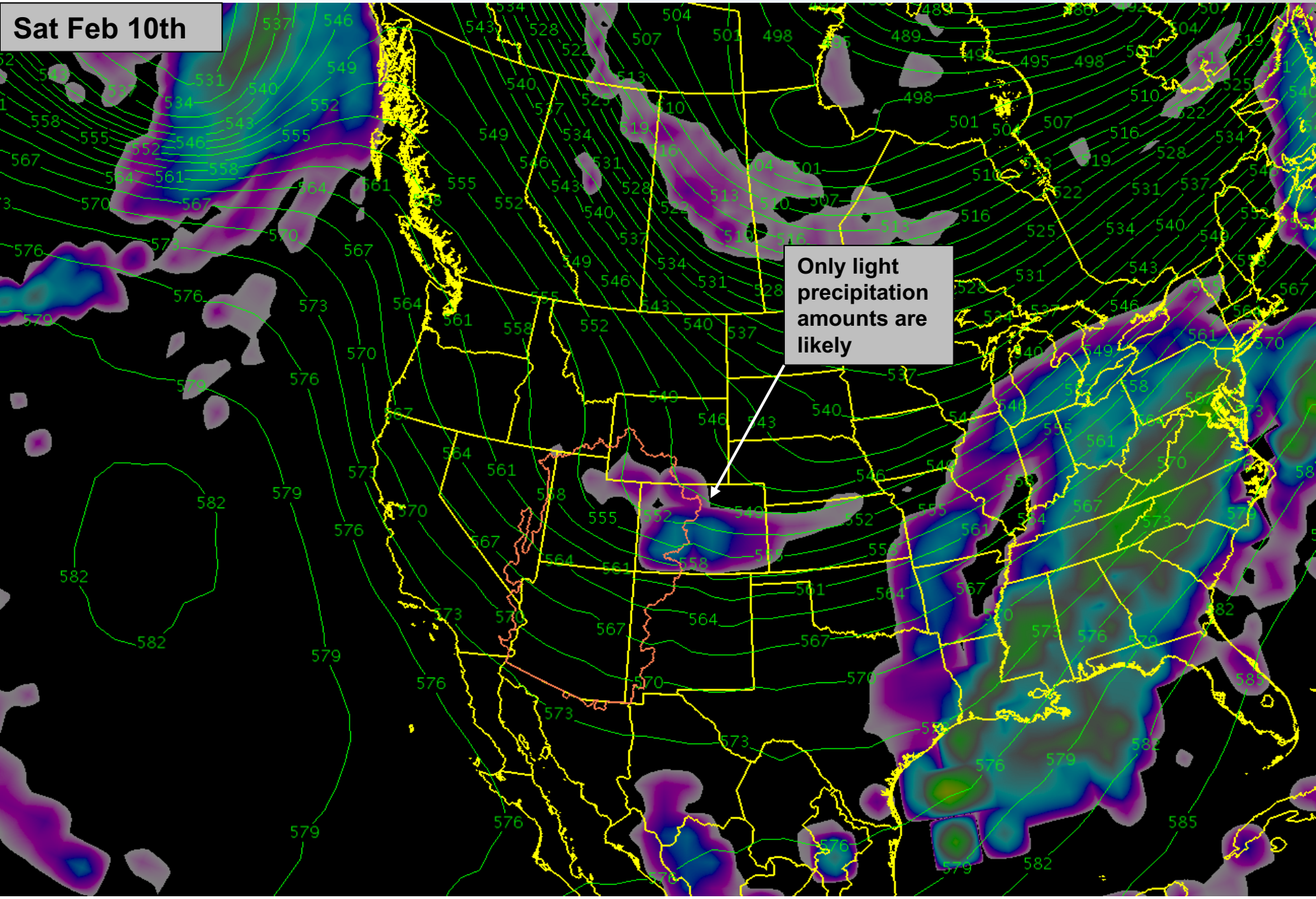
Upcoming Weather: Current Pattern as of Today



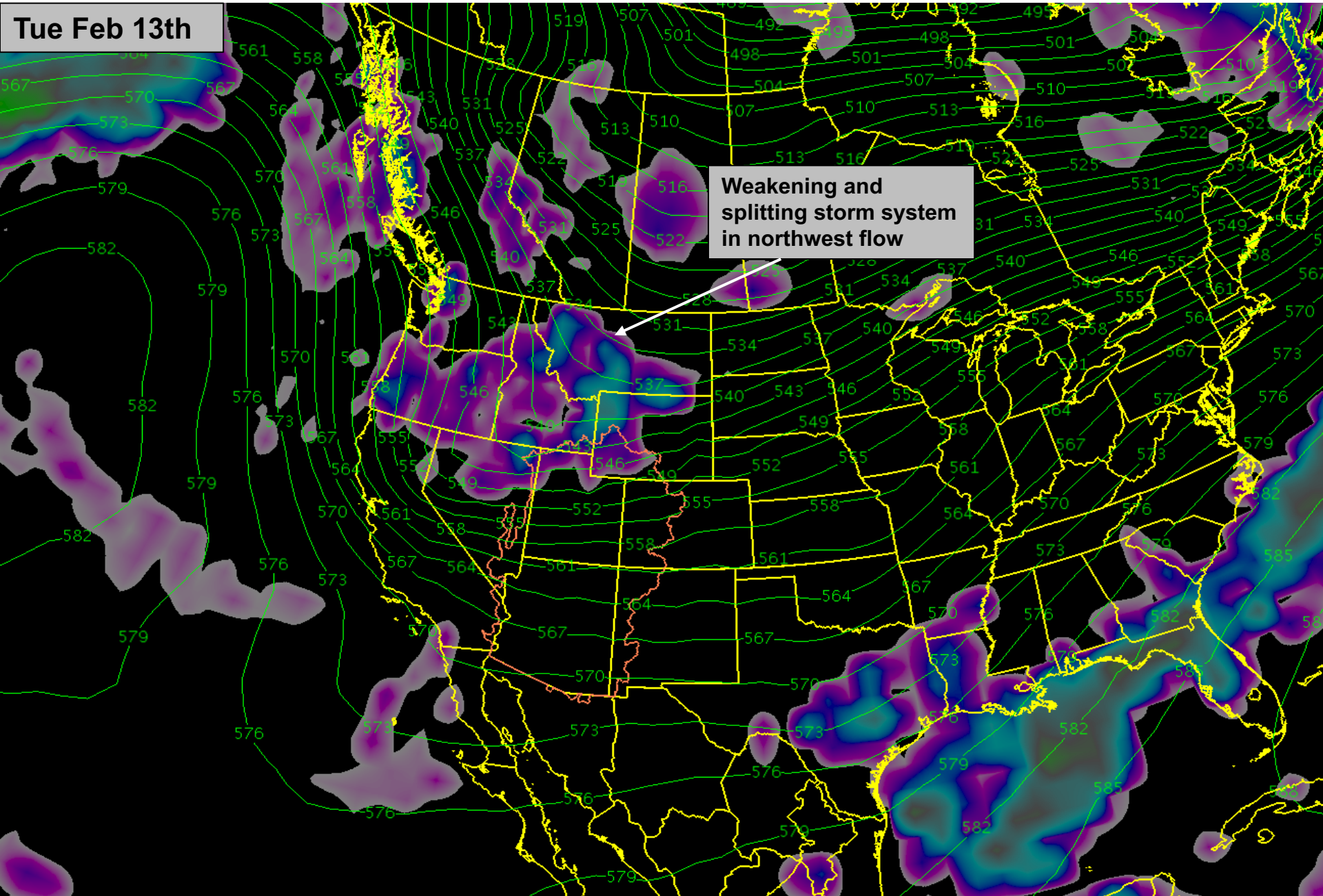
Upcoming Weather: Weak storms in a northwest flow may impact the upper Green River Basin (Wyoming).



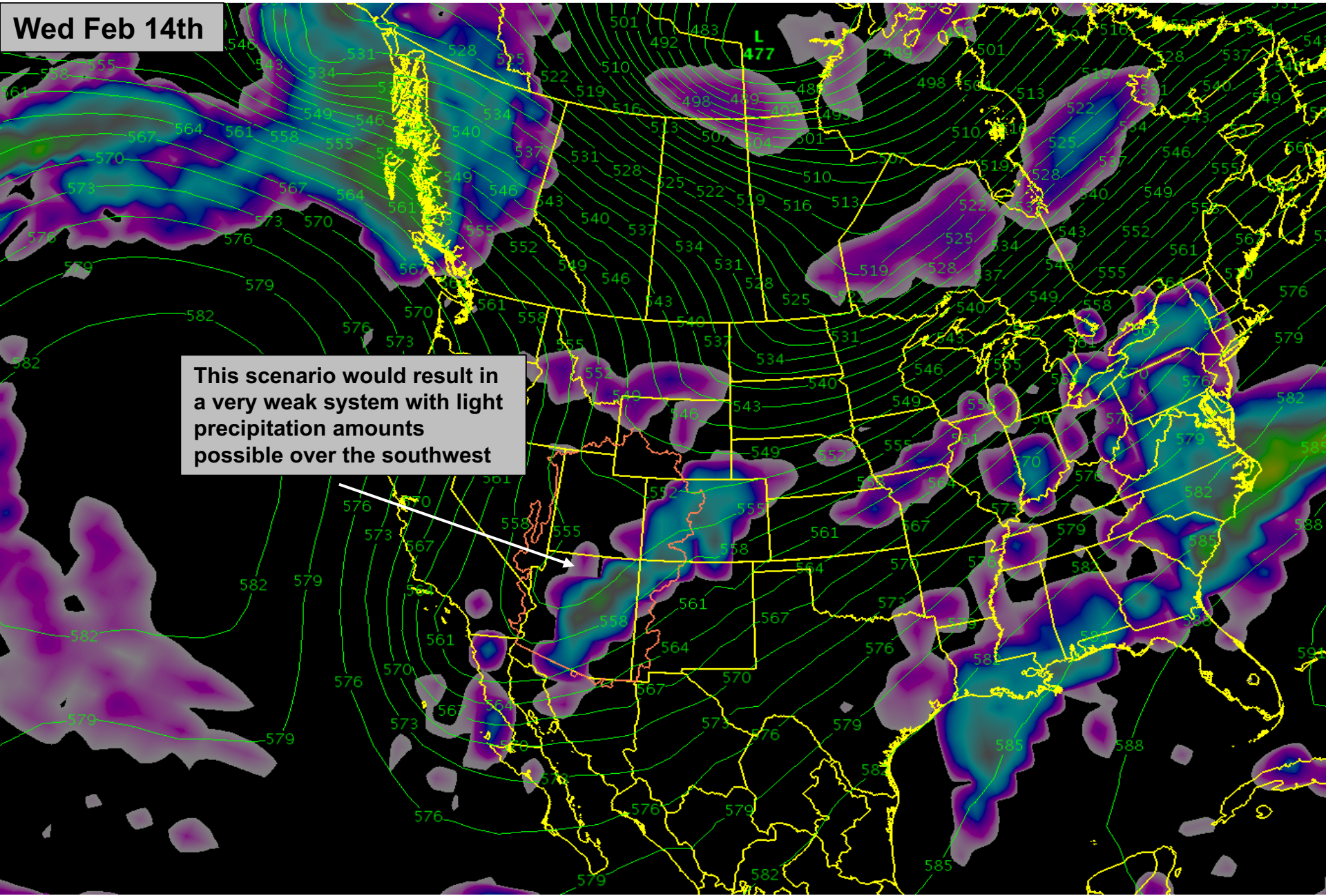
Upcoming Weather: Light precipitation amounts possible along the eastern boundary, high elevation headwater areas, of the CBRFC Forecast area.



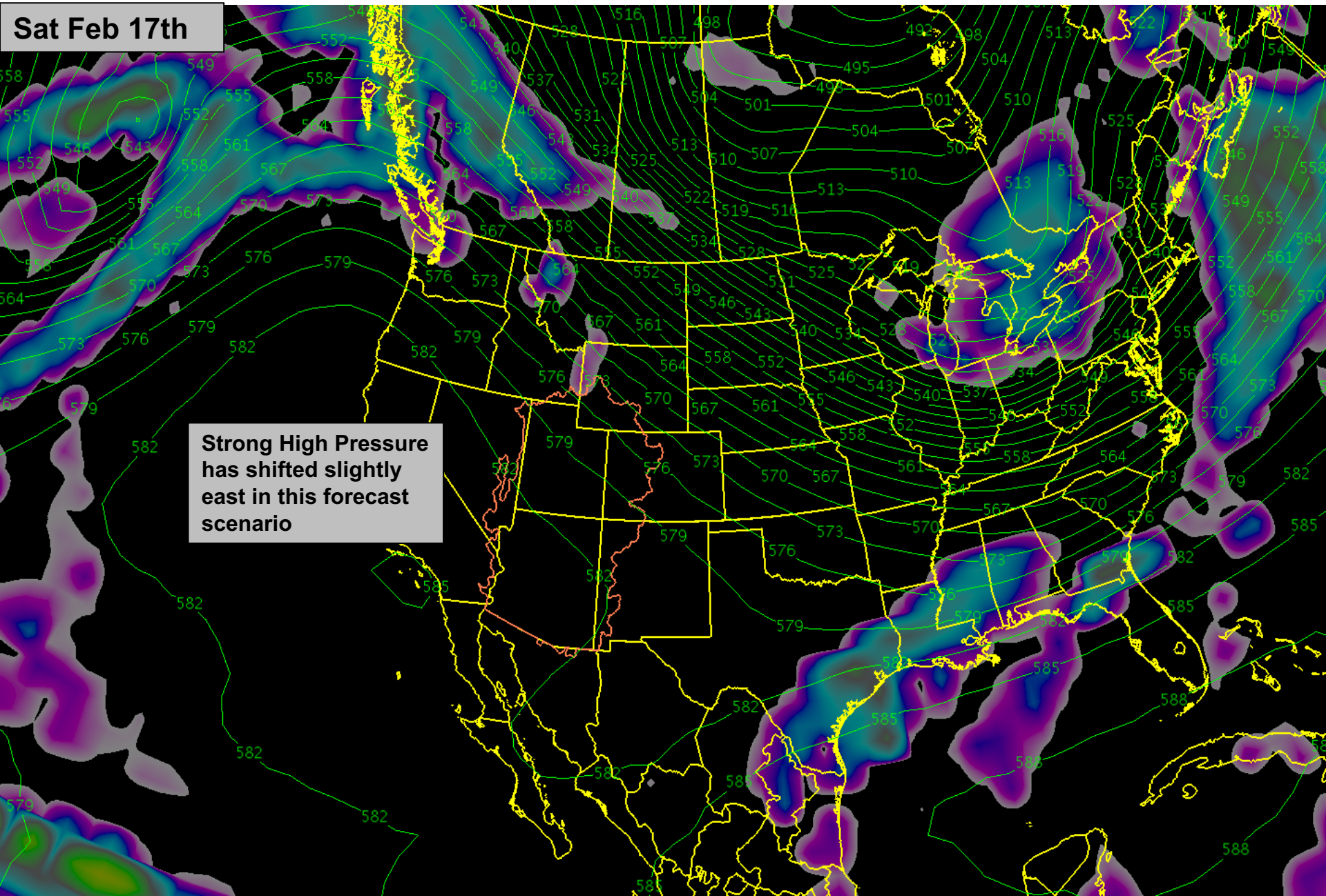
Upcoming Weather: Another storm system drops southward. The model splits and weakens the storm system. Precipitation amounts likely to be light.



Upcoming Weather: Models have been struggling with a scenario of developing a closed low pressure over southern California. Confidence is quite low at this time.

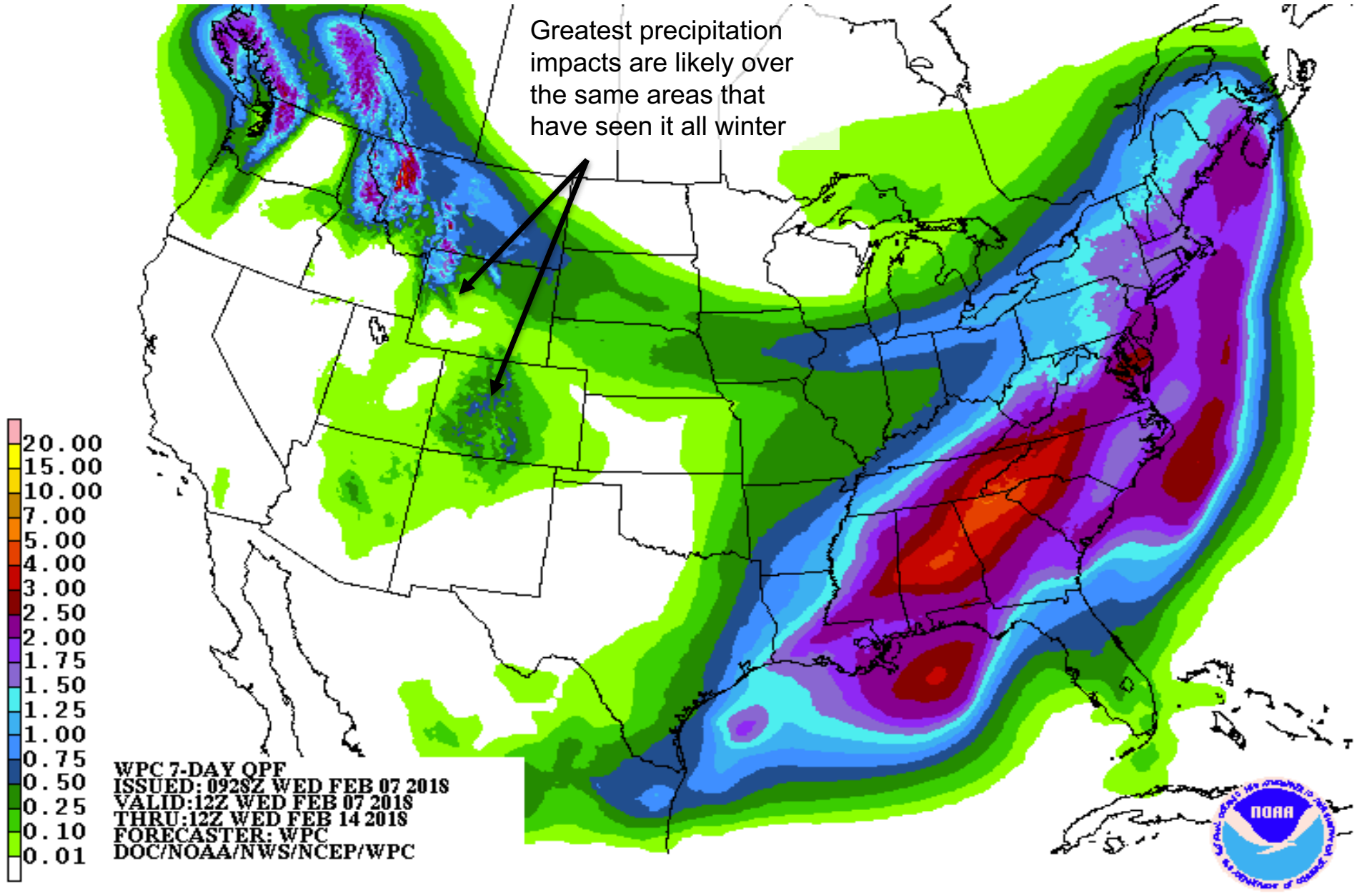


Upcoming Weather: Not much change 10 days out with a northwest flow over the area. Ridge. The ridge axis has shifted east. This would decrease precipitation chances.



Upcoming Weather

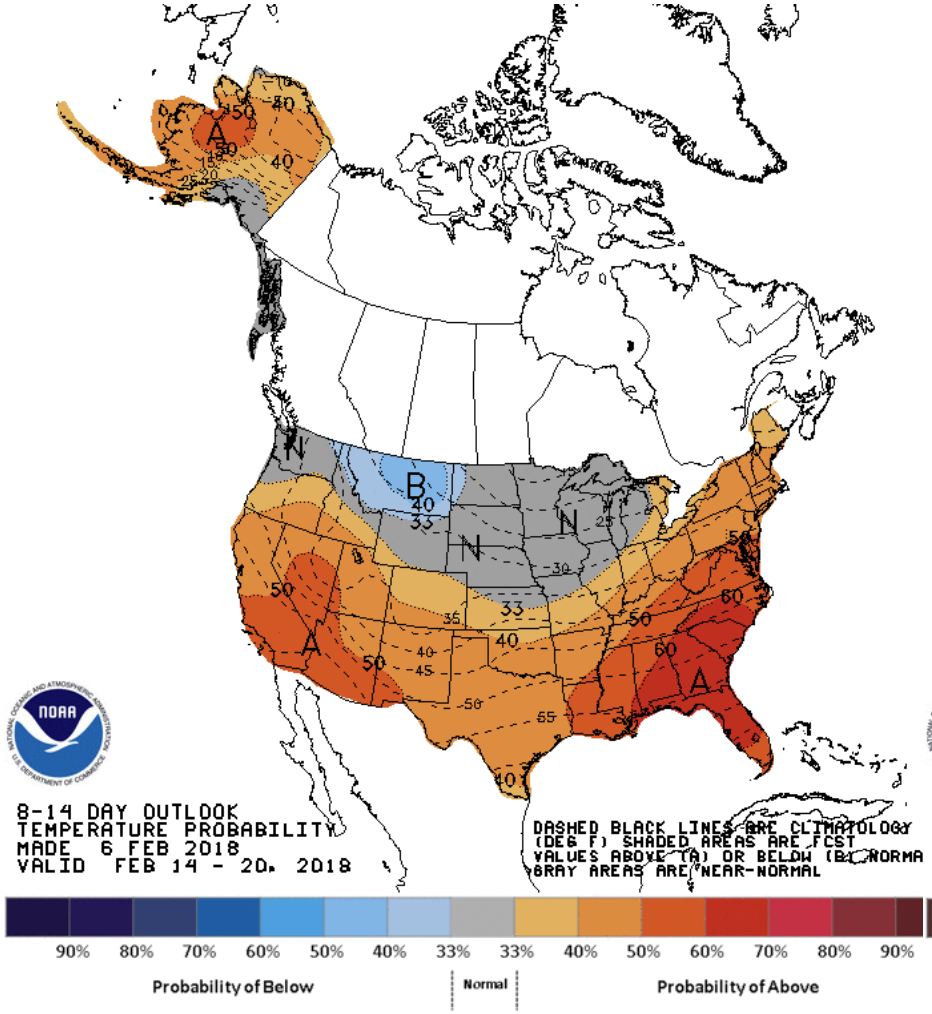
NWS Weather Prediction Center: Precipitation Forecast Feb 7 – Feb 14



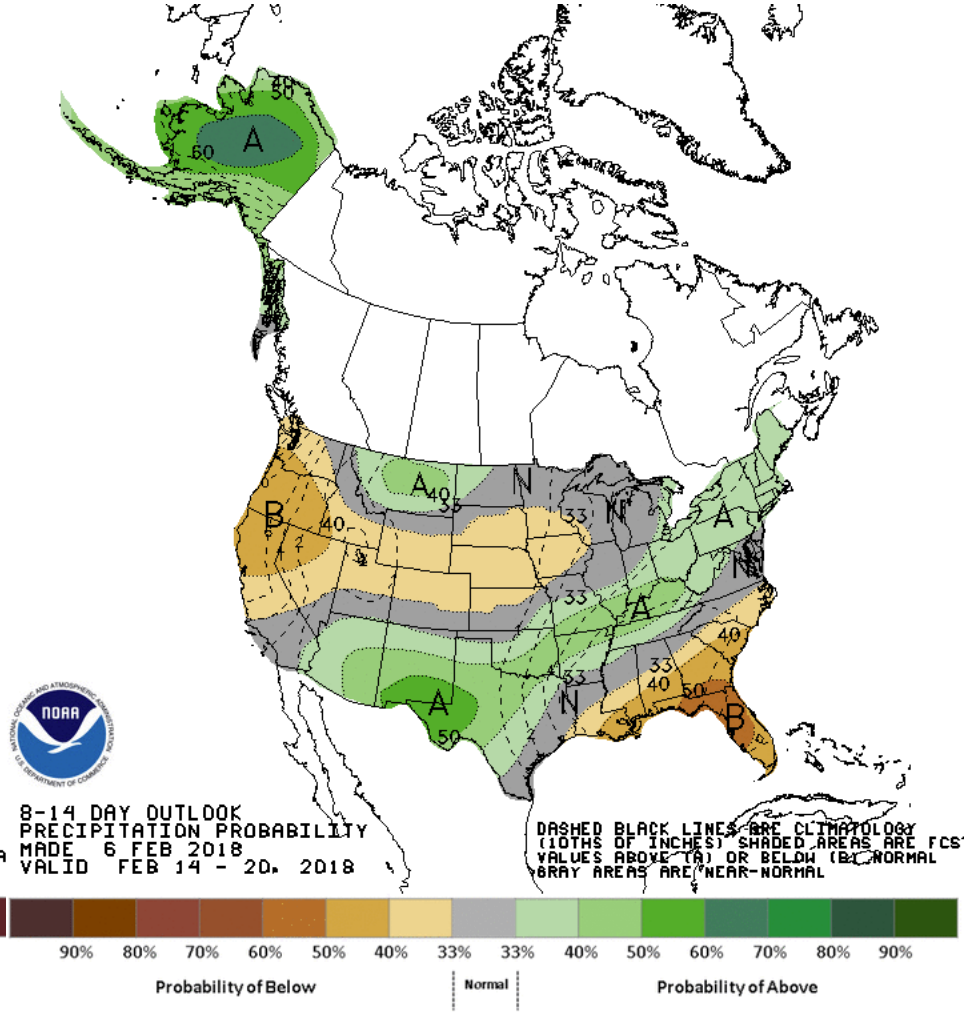
Upcoming Weather and Impacts to Water Supply Forecasts

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

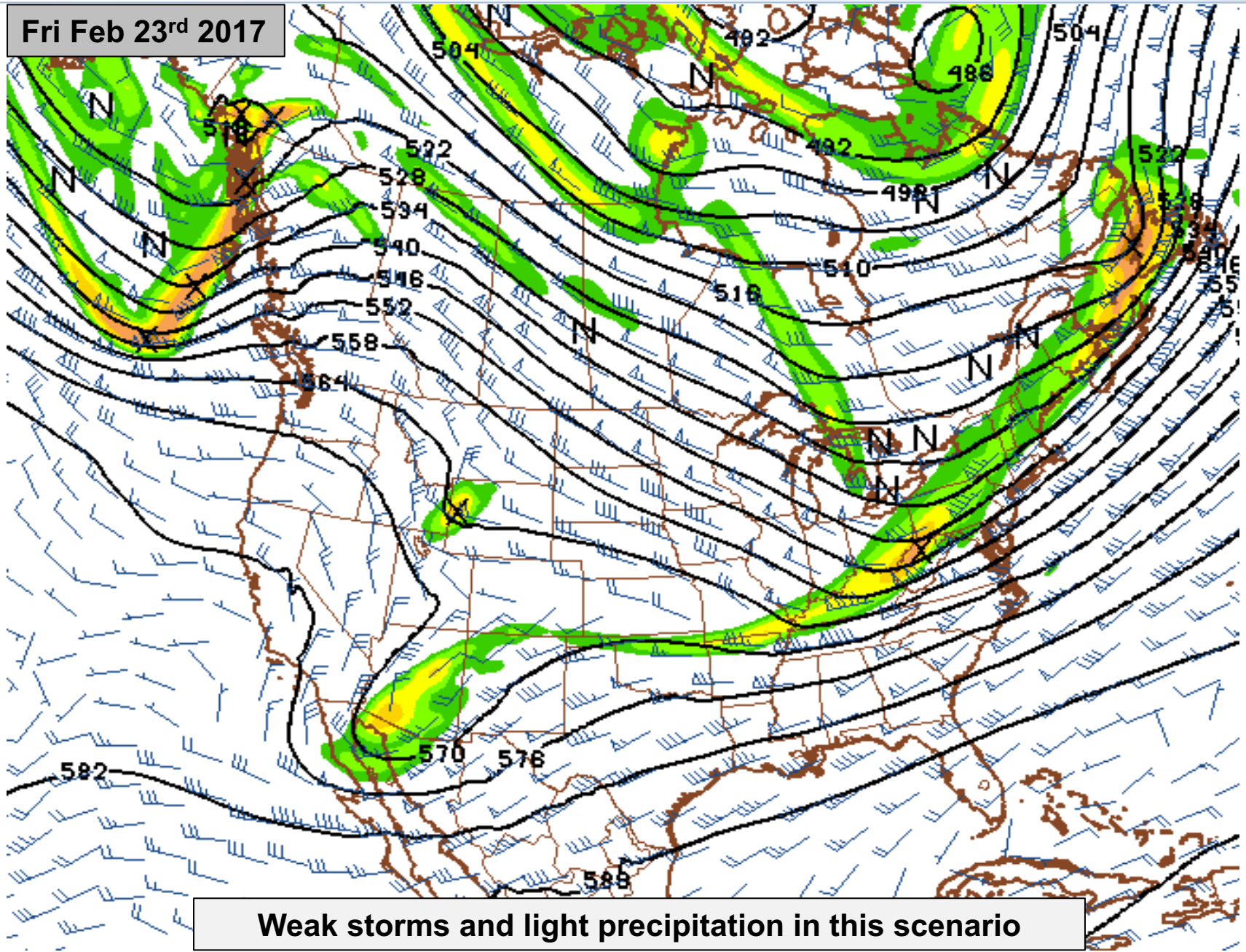
Temperature Probabilities



Precipitation Probabilities



Long Range Weather Outlook: Storm systems appear weak at best as they encounter and move around the high pressure ridge. Models are inconsistent so confidence is low.



Key Points

The Dry fall and early winter continued into January with below average precipitation.

Outside of the upper Green headwaters in Wyoming and eastern Colorado River mainstem headwaters, the snow situation is pretty grim. The worst conditions are in the San Juan, Dolores, parts of the Gunnison, and from central/southern Utah into the Lower Colorado Basin of Arizona and New Mexico.

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

Forecasts decreased everywhere from those issued in January except for some sites in the upper Green and Colorado River headwaters. Largest decrease were in parts of the Duchesne, parts of the Gunnison, Dolores, and San Juan Basins.

Generally less than 30 percent of median runoff is anticipated for Feb-May in the Lower Colorado River Basin.

Long term our official forecast uses average conditions (climatology). A wet month in the future mix would result in some rebound in water supply forecasts but reaching near average runoff would take abnormally wet spring conditions in many areas.

2018 water supply briefing schedule

2018 monthly water supply briefings for the Colorado Basin

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 (there is one today)

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.

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