CBRFC
March 2017
CUWCD Briefing

1pm March 8, 2017

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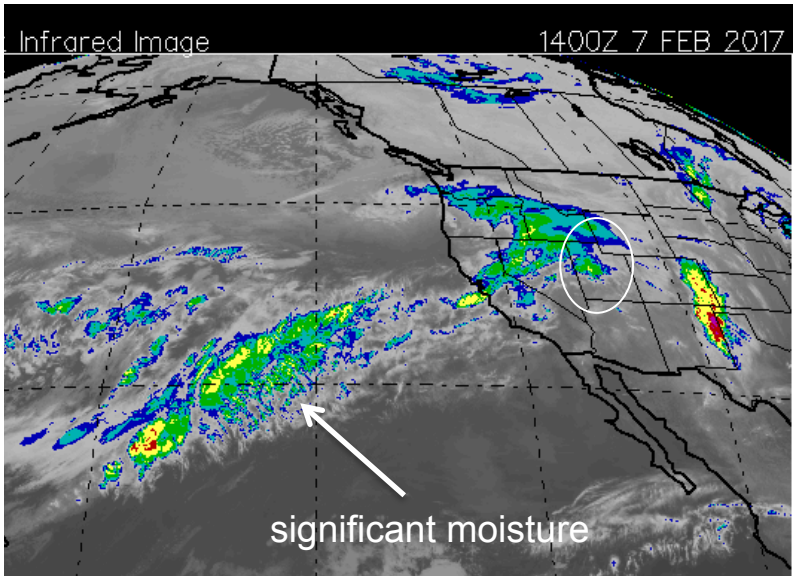
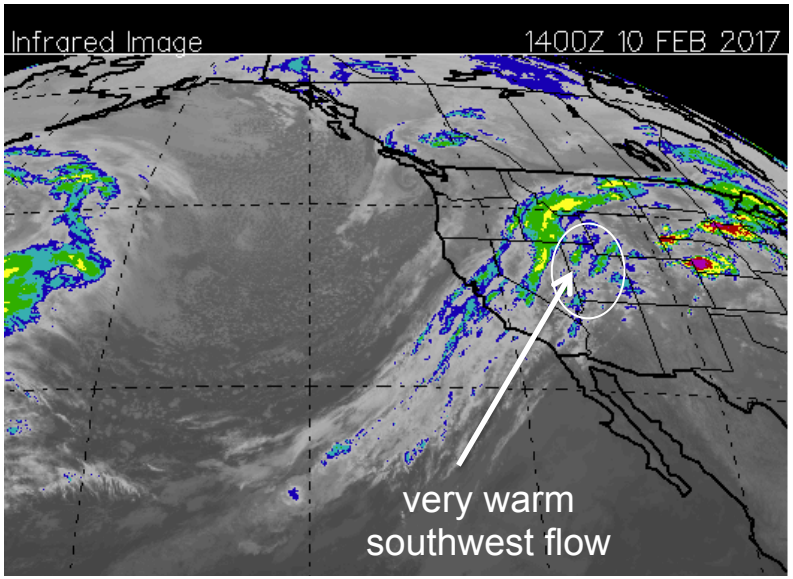
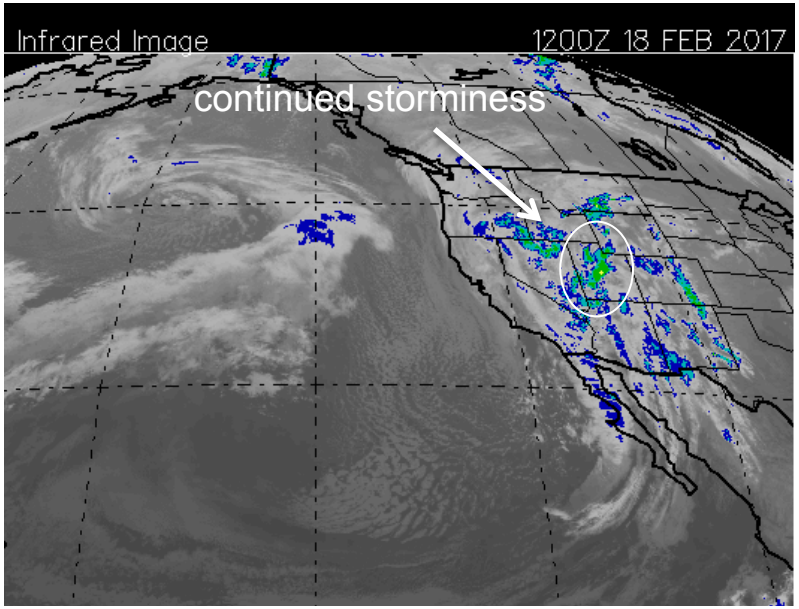
Today's Presentation

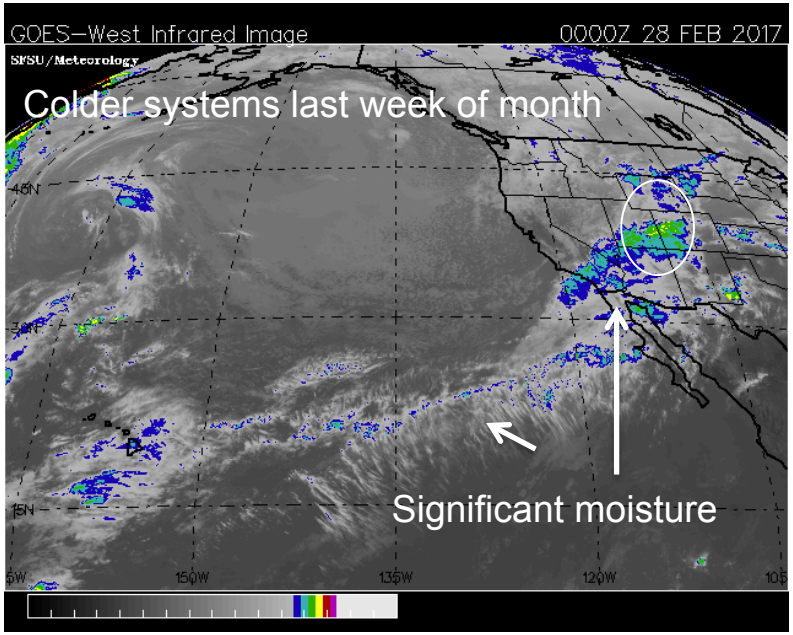
- February Weather
- Soil Moisture
- Current snowpack conditions
- 2017 Water Supply Forecasts
- March forecasts-How good are they?
- Peak Flow Forecasts
- Upcoming Weather

February Weather



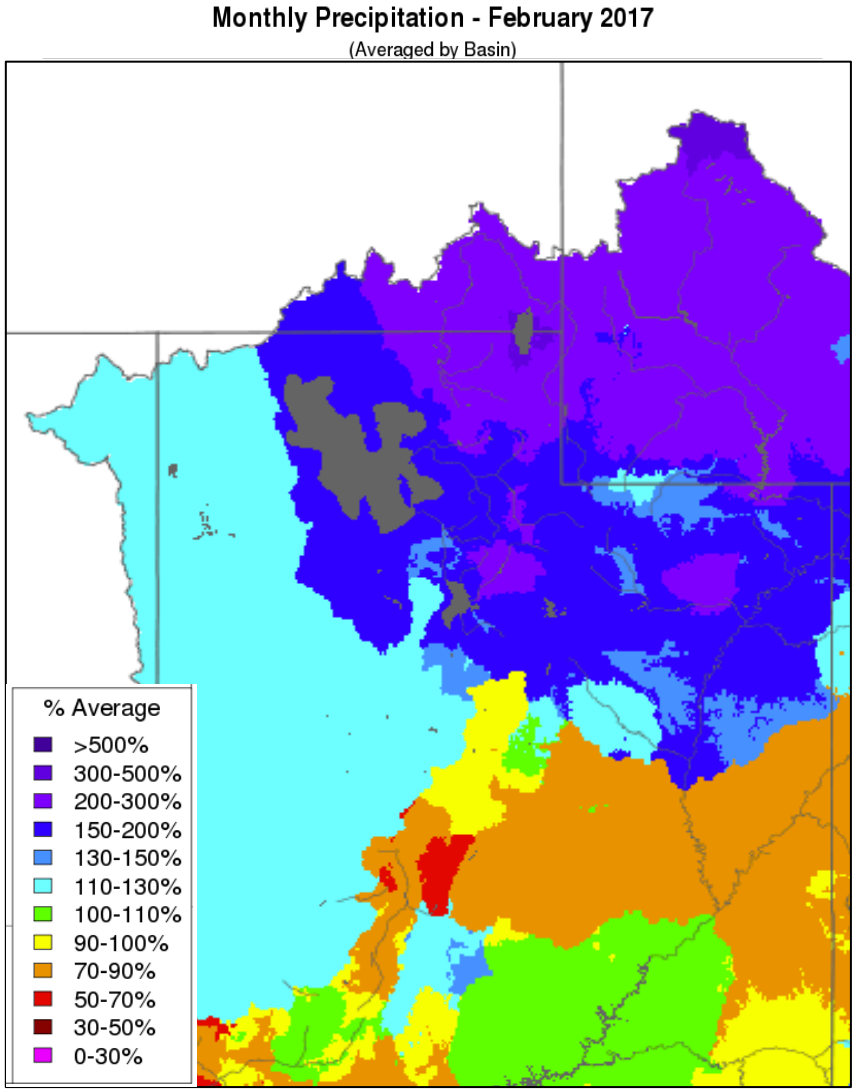




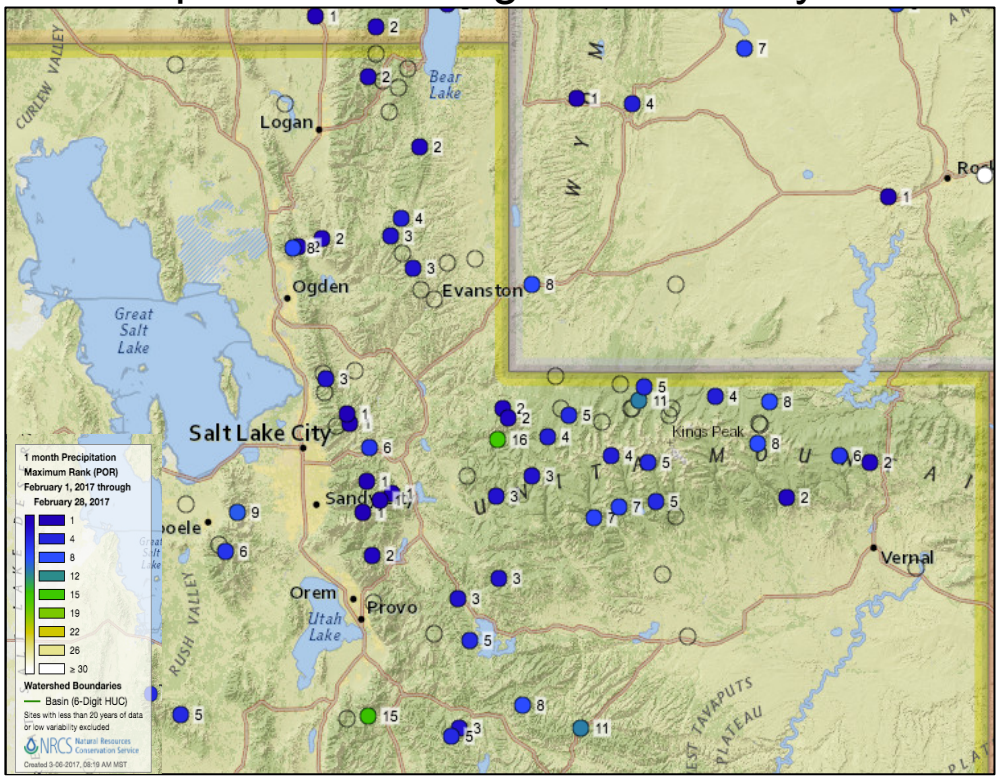


San Francisco State University Satellite Image Archive

February Weather: Precipitation

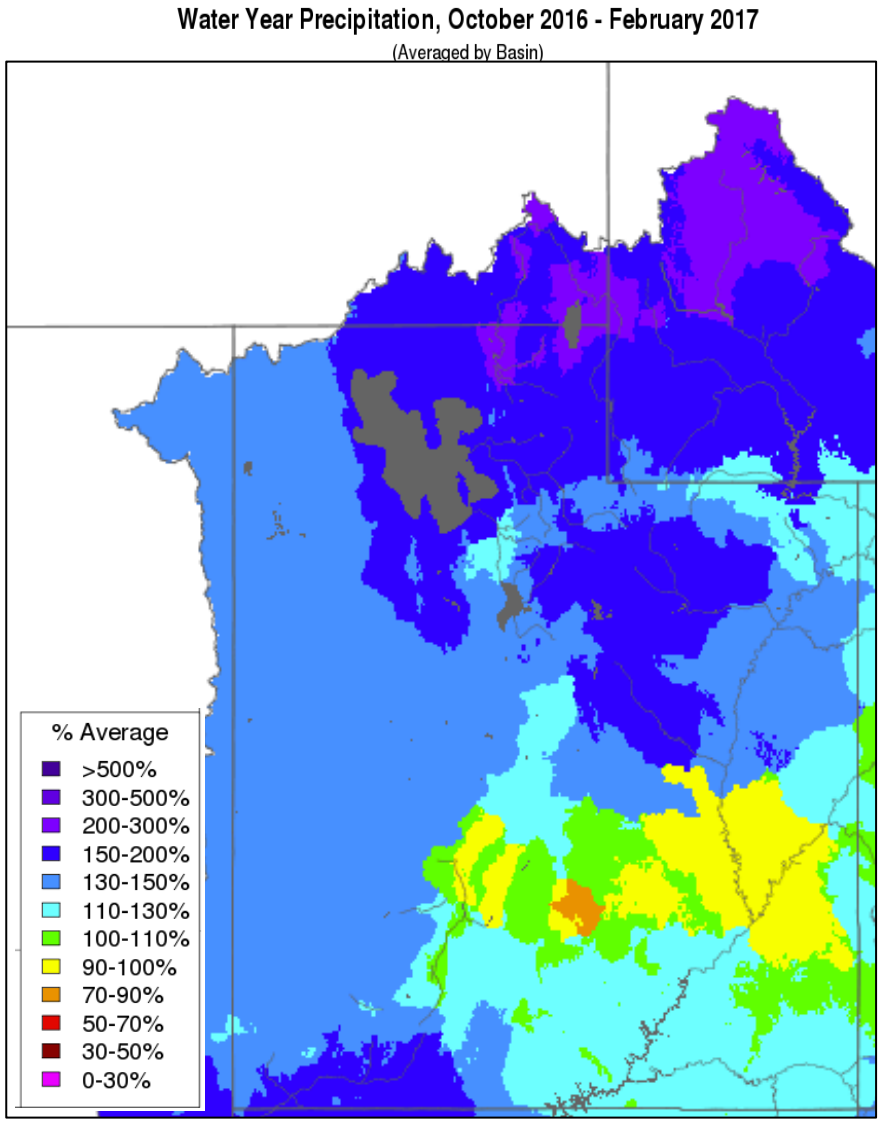


Precipitation Rankings for February 2017



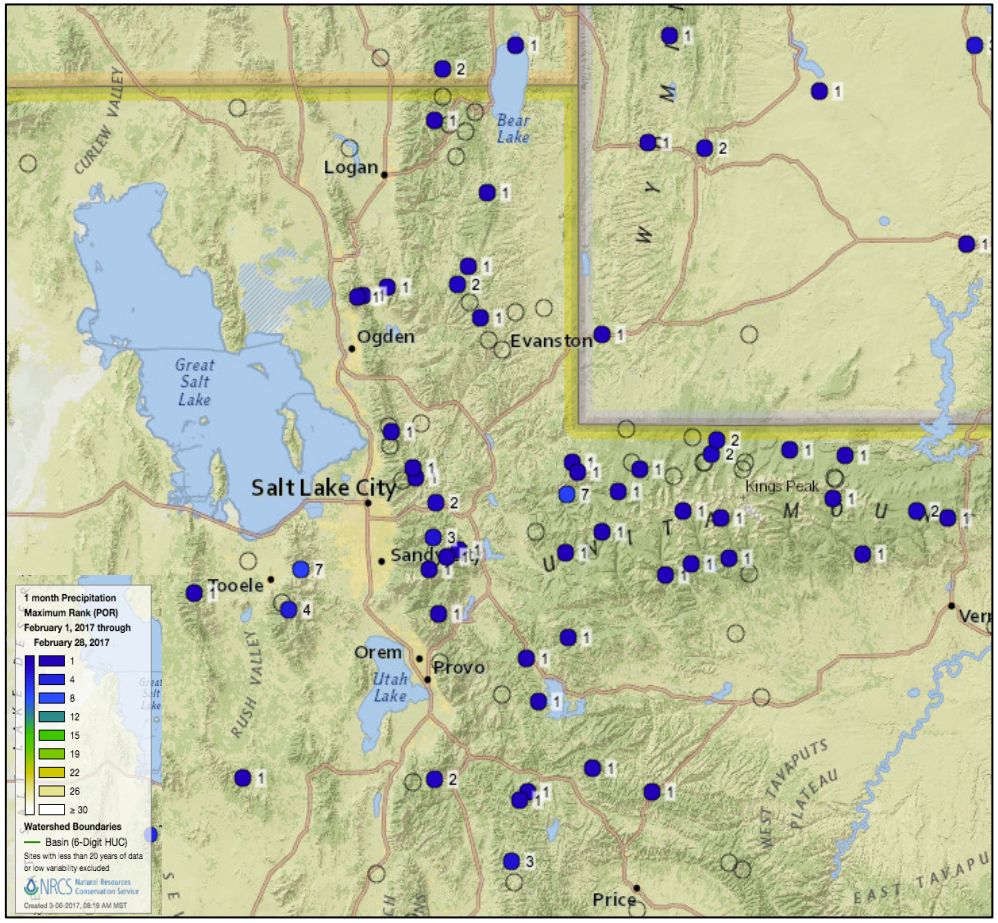
Duchesne: 165%
Provo/UT Lake: 185%

Water Year Precipitation



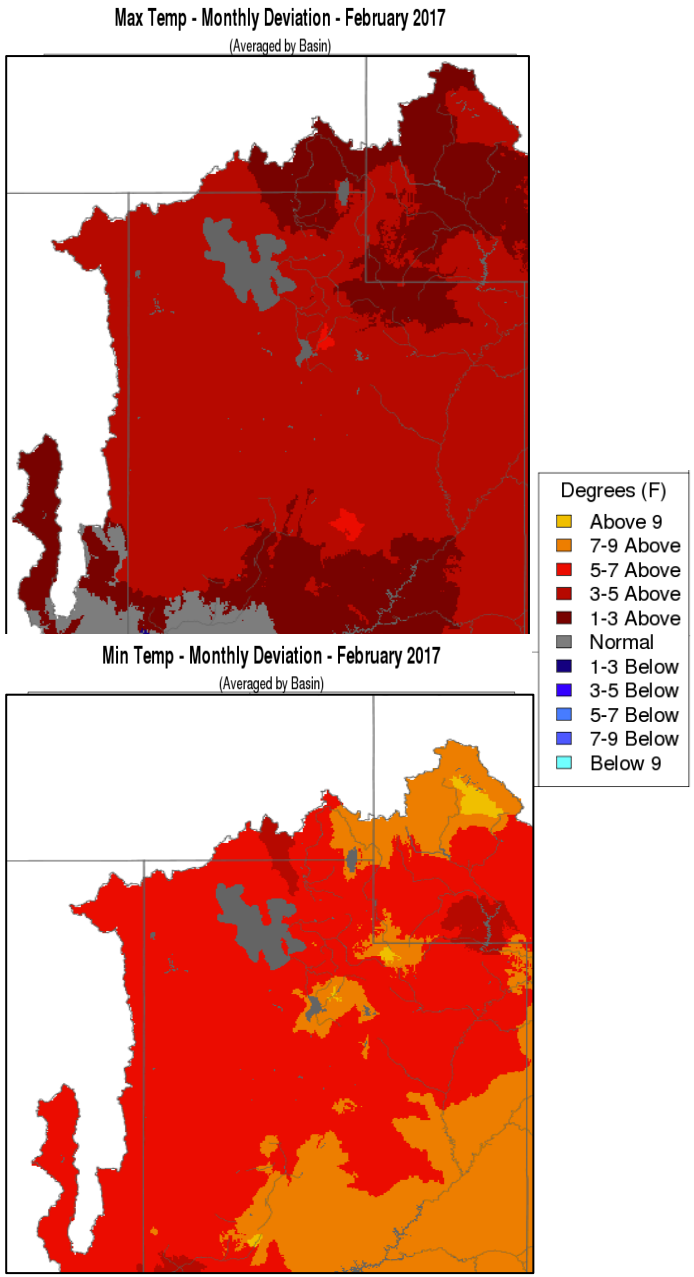
Duchesne: 160%
Provo: 160%

Precipitation Rankings for Dec-Feb 2017

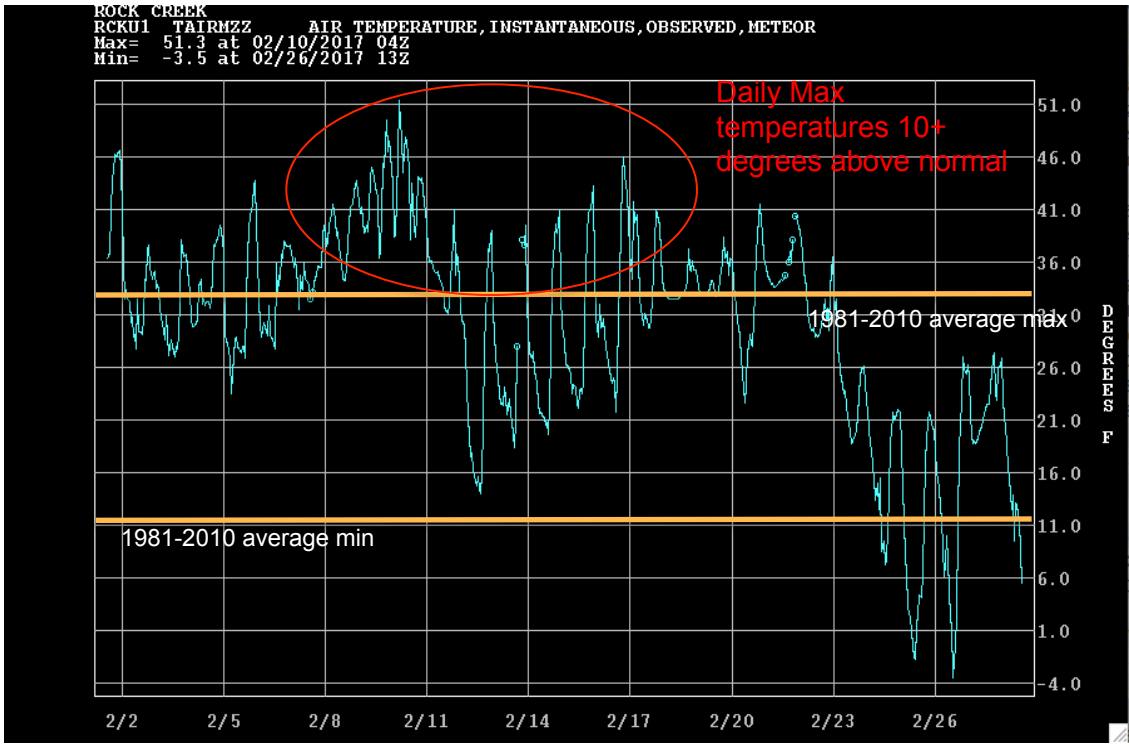


Many locations have record precipitation for Dec-Feb precipitation

February Weather: Temperature



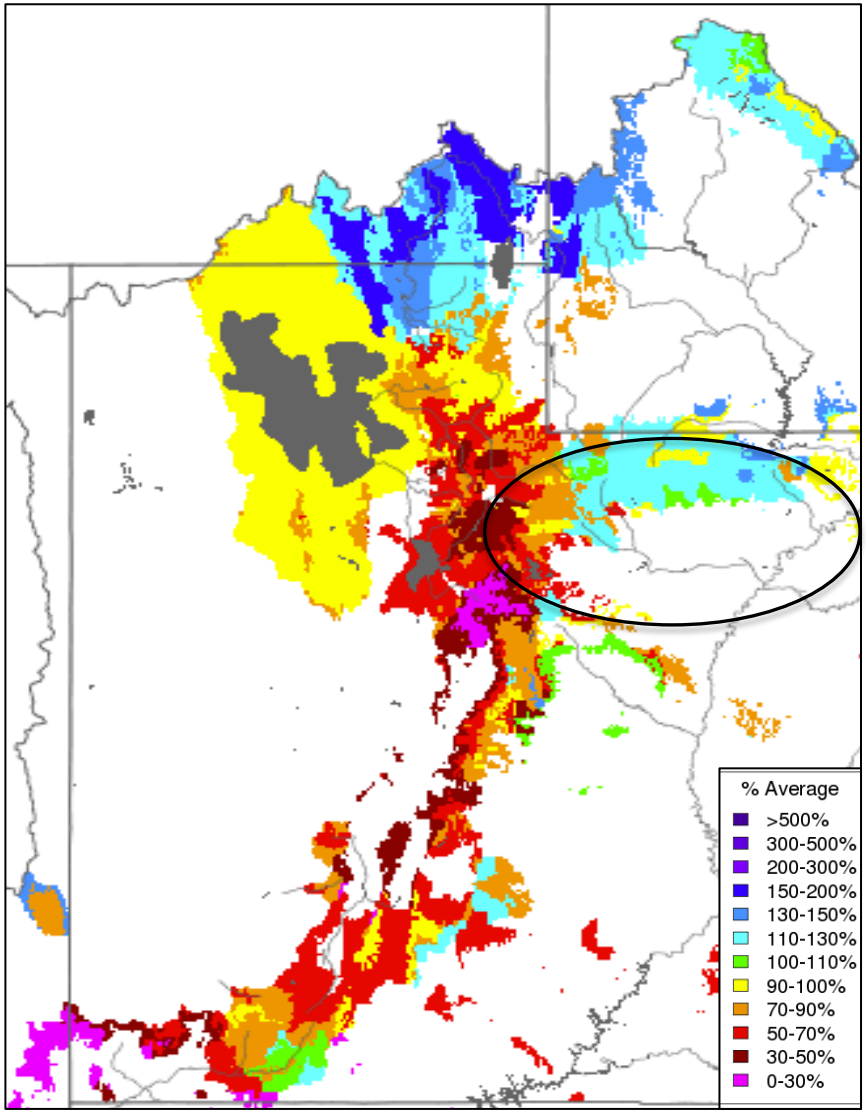
Rock Creek SNOTEL Instantaneous Temperature



Soil Moisture Impacts

Impacts to Soil Moisture Entering Winter

Soil Moisture – Fall – 2016 (November 16)
(Modeled, Averaged by Basin)



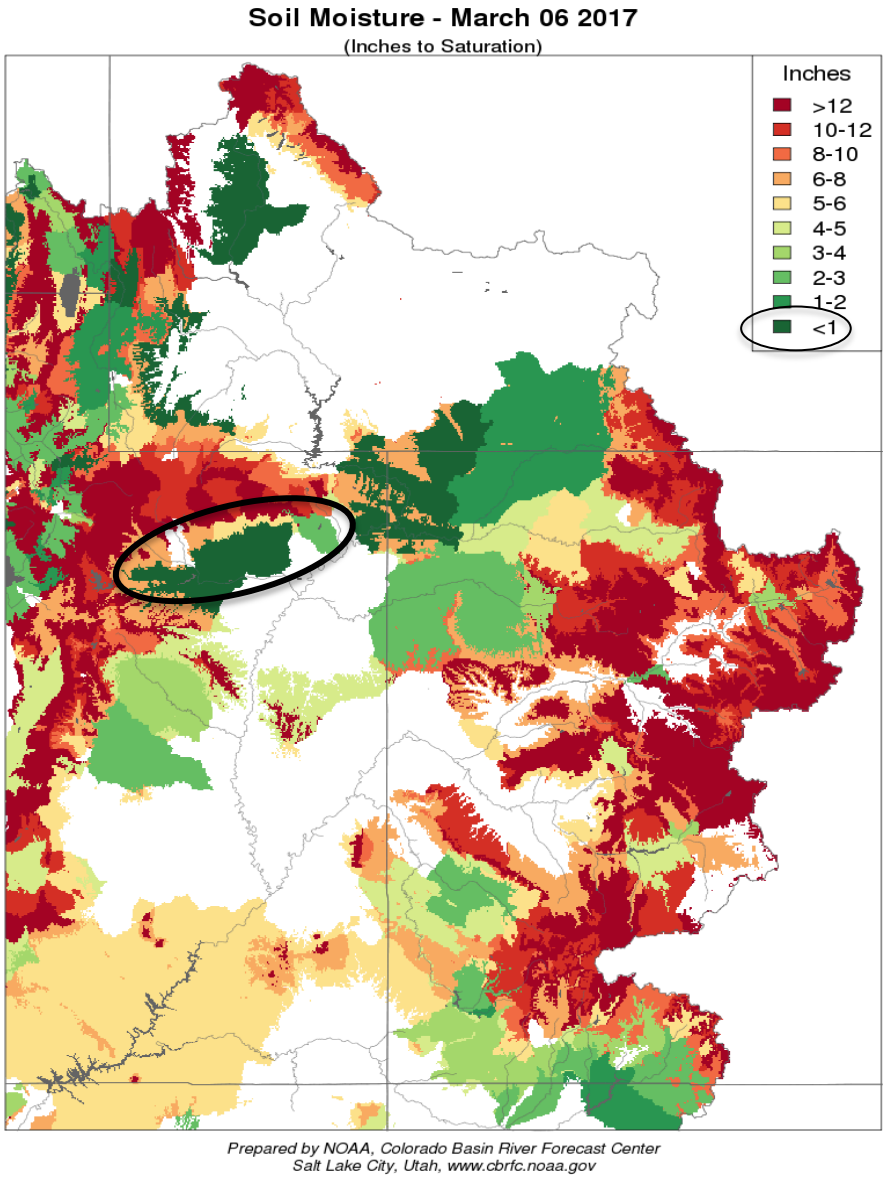
2017 Water Supply Impacts:

- A driver of early season forecasts higher/ lower by 3-10% of average
- Significant snowpack, like this year, lessens the impacts of dry soils on spring runoff
- Significant snowpack + wet soils could see more enhanced spring runoff

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

Soil Moisture Impacts

Current Model Soil Saturation Conditions



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

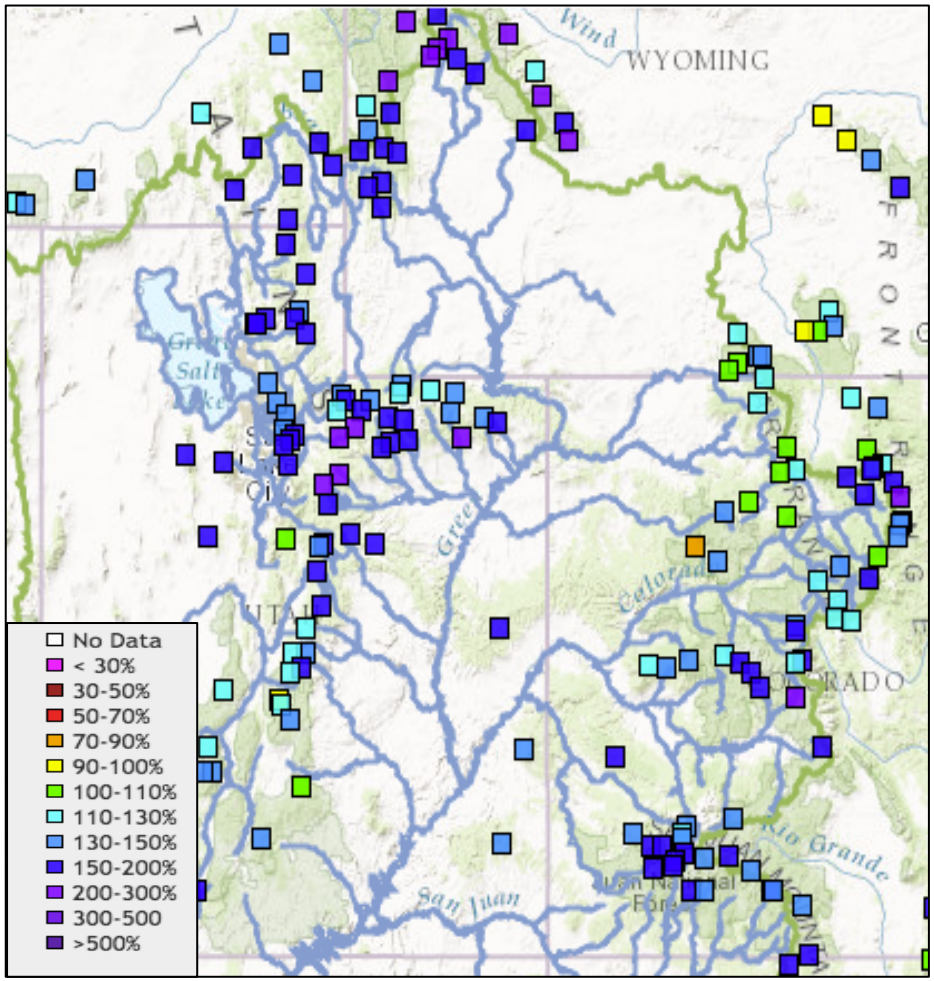
Primary Use: Where very efficient runoff is likely (due to additional snowmelt or rainfall)

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

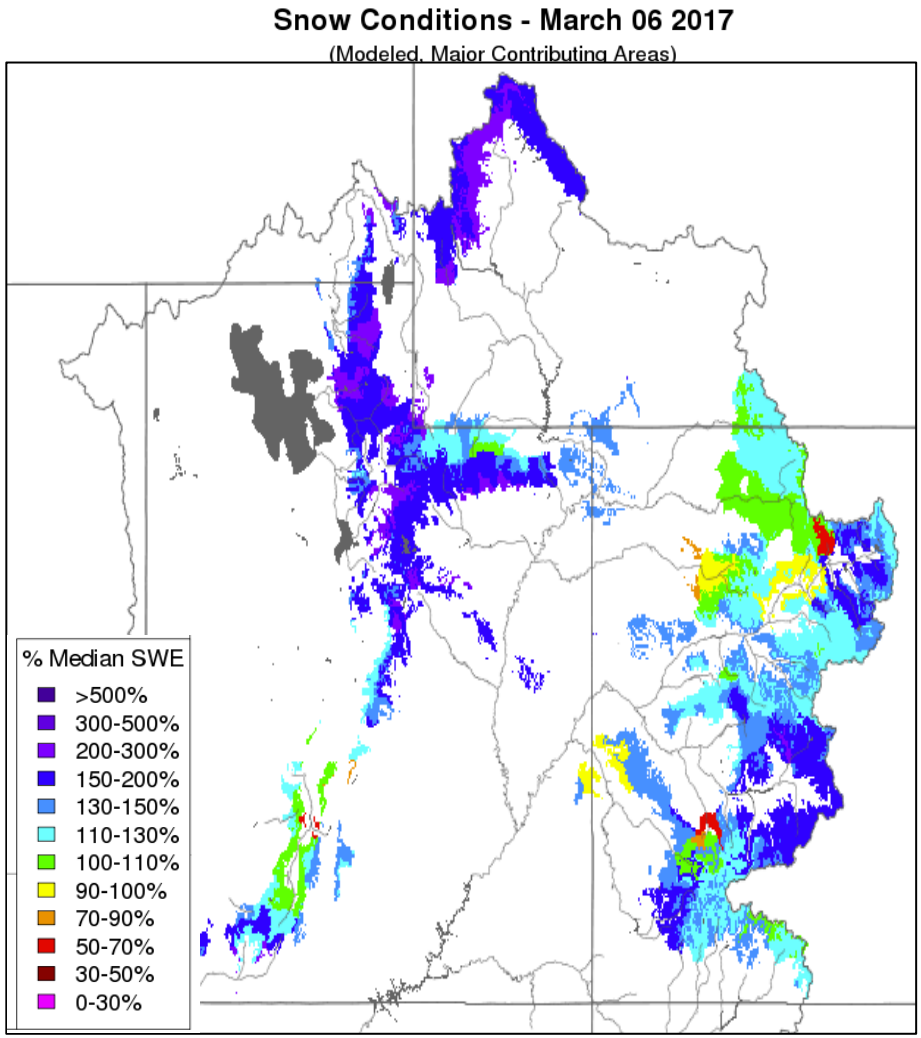
*****Not a representation of above / below average soil moisture conditions**

Snow Conditions

SNOTEL (% median): March 6, 2017

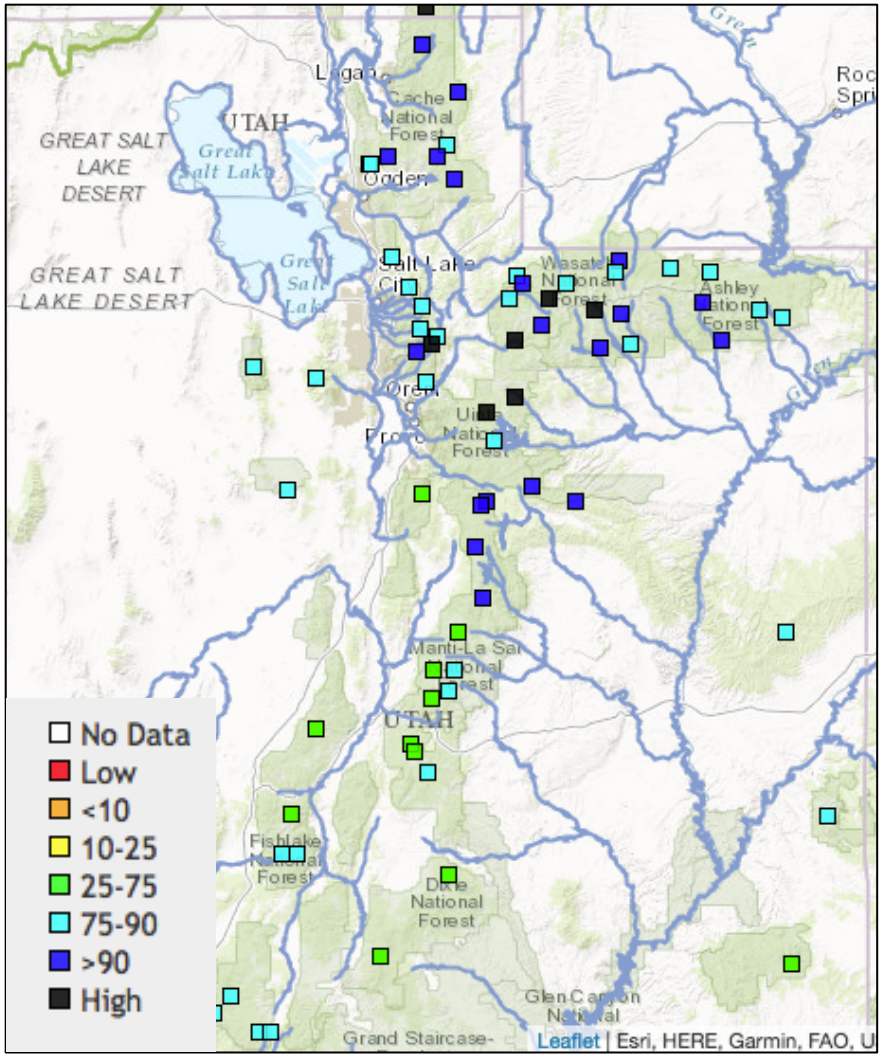


CBRFC MODEL SNOW (% median):



Snow Conditions

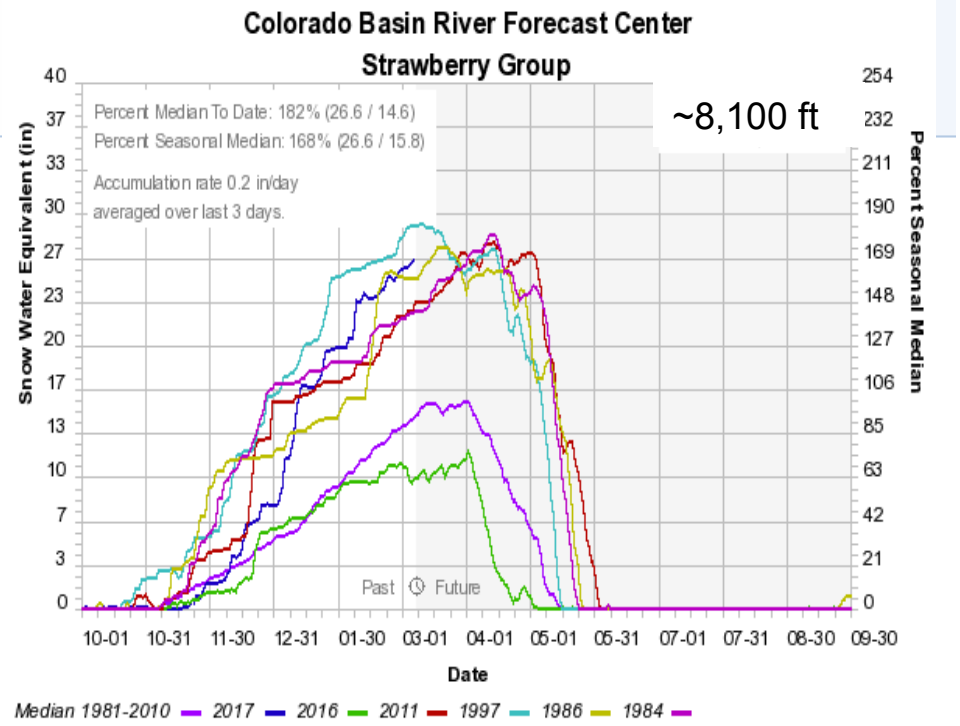
Snow Water Equivalent Percentile Ranking
SNOTEL: March 8, 2017

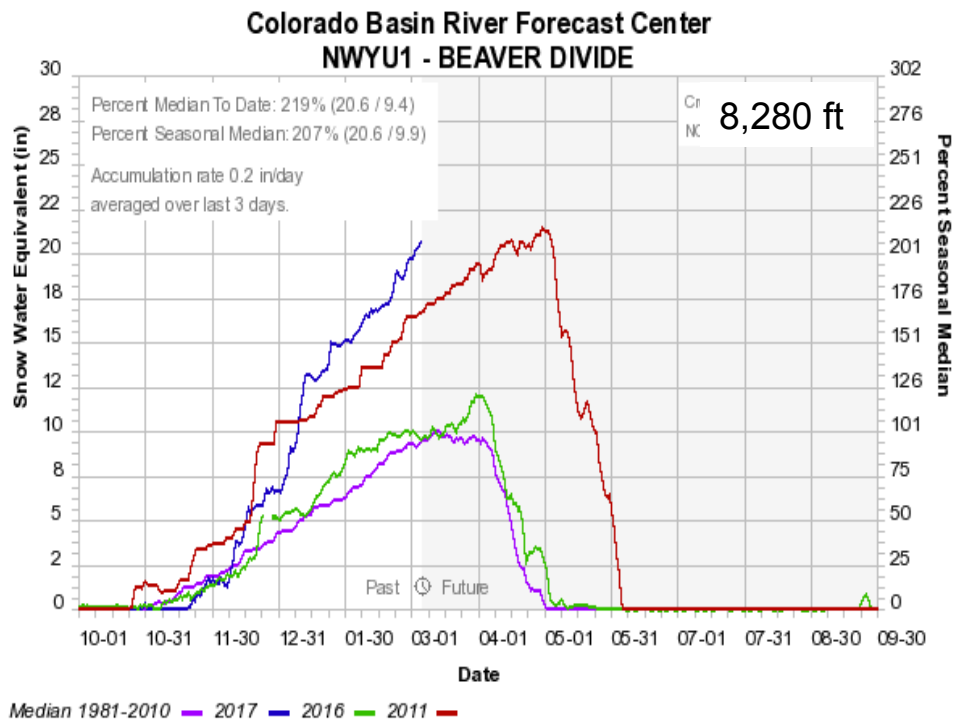


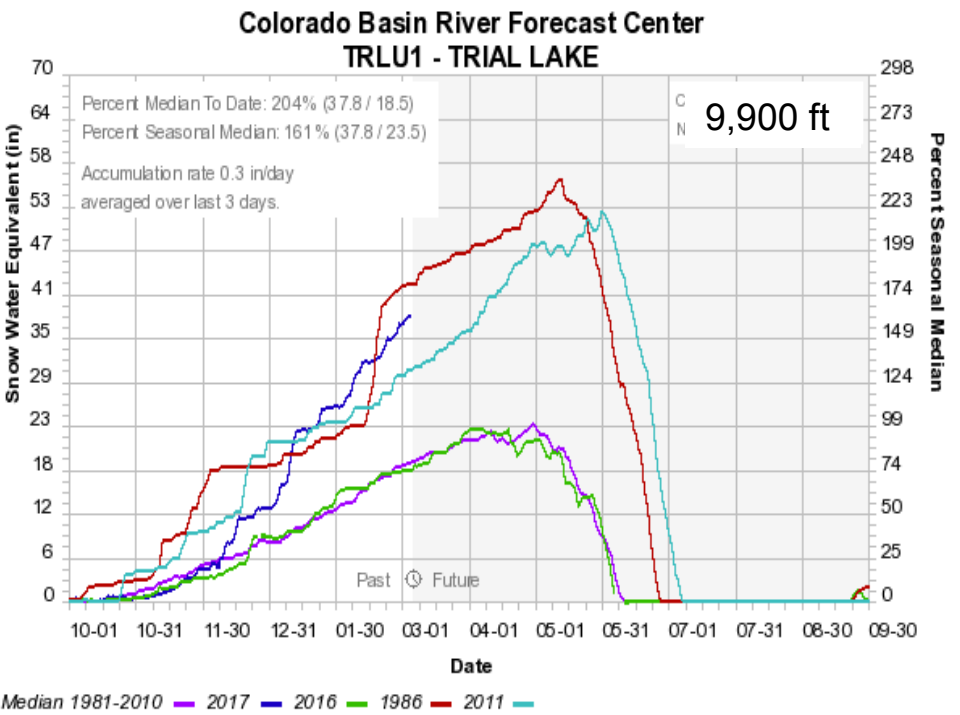
■ = Record SWE for this time of year

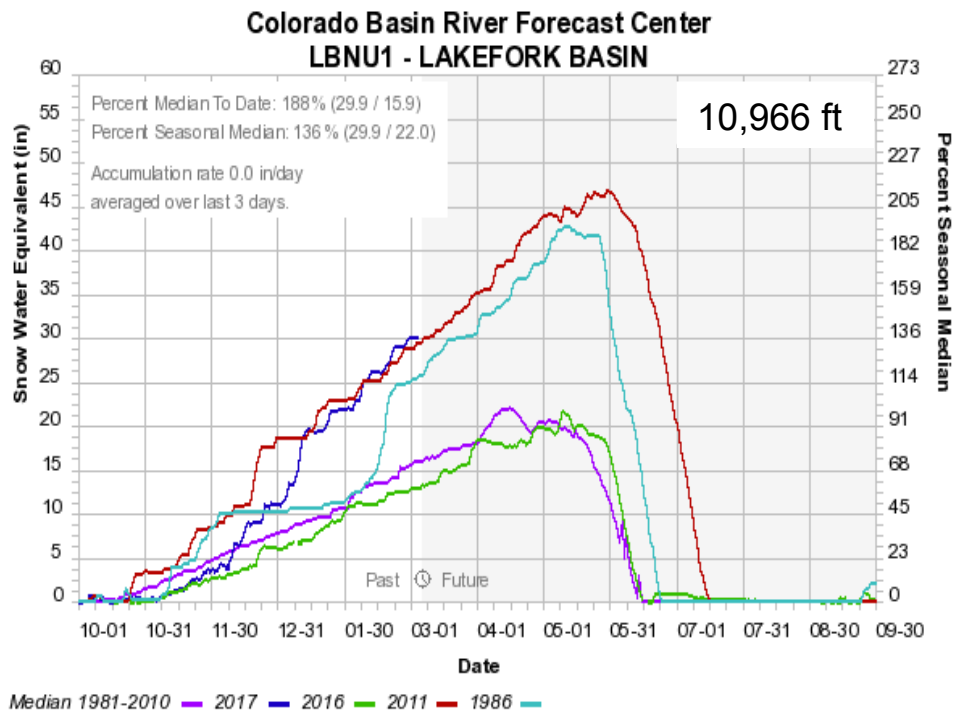
Daniels-Strawberry
Currant Creek
Beaver Divide
Lakefork Basin

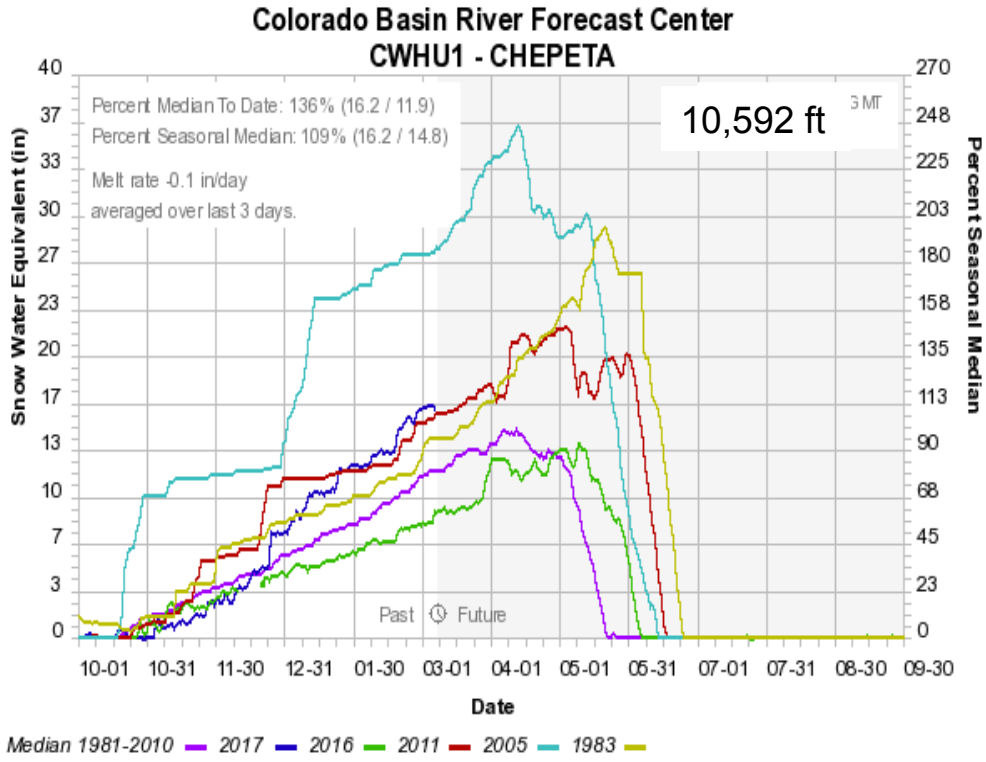
■ = SWE in top 2-3

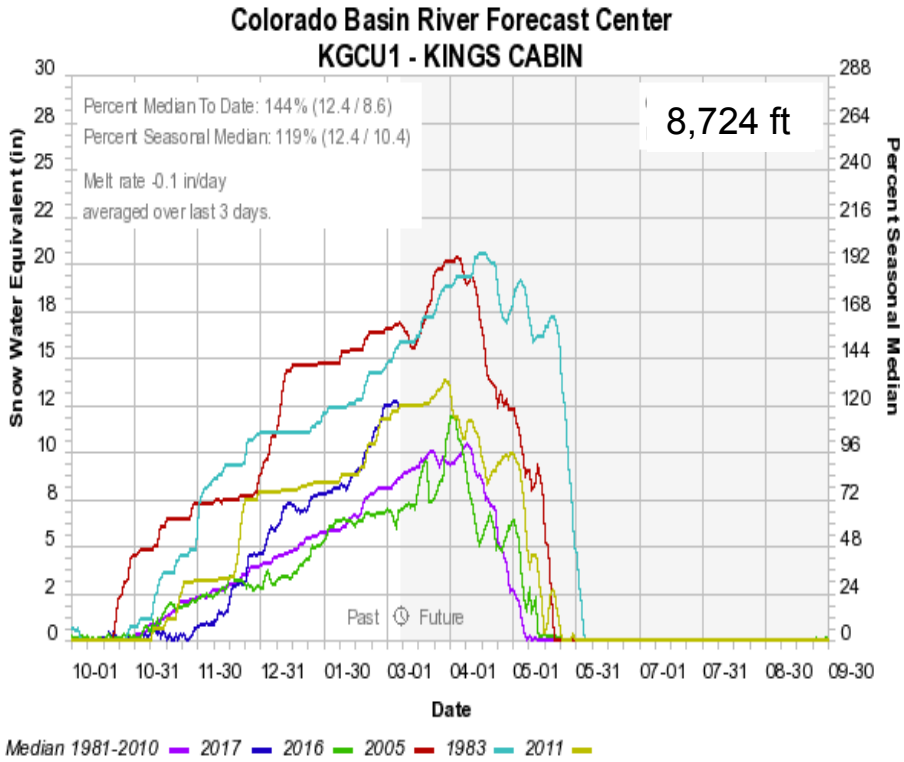

Colorado Basin River Forecast Center
Strawberry Group
~8,100 ft
Percent Median To Date: 182% (26.6 / 14.6)
Percent Seasonal Median: 168% (26.6 / 15.8)
Accumulation rate 0.2 in/day
averaged over last 3 days.
Past
Future
Snow Water Equivalent (in)
Percent Seasonal Median
Date
Median 1981-2010
2017
2016
2011
1997
1986
1984


Colorado Basin River Forecast Center
NWYU1 - BEAVER DIVIDE
8,280 ft
Percent Median To Date: 219% (20.6 / 9.4)
Percent Seasonal Median: 207% (20.6 / 9.9)
Accumulation rate 0.2 in/day
averaged over last 3 days.
Past
Future
Snow Water Equivalent (in)
Percent Seasonal Median
Date
Median 1981-2010
2017
2016
2011


Colorado Basin River Forecast Center
TRLU1 - TRIAL LAKE
9,900 ft
Percent Median To Date: 204% (37.8 / 18.5)
Percent Seasonal Median: 161% (37.8 / 23.5)
Accumulation rate 0.3 in/day
averaged over last 3 days.
Past
Future
Snow Water Equivalent (in)
Percent Seasonal Median
Date
Median 1981-2010
2017
2016
1986
2011

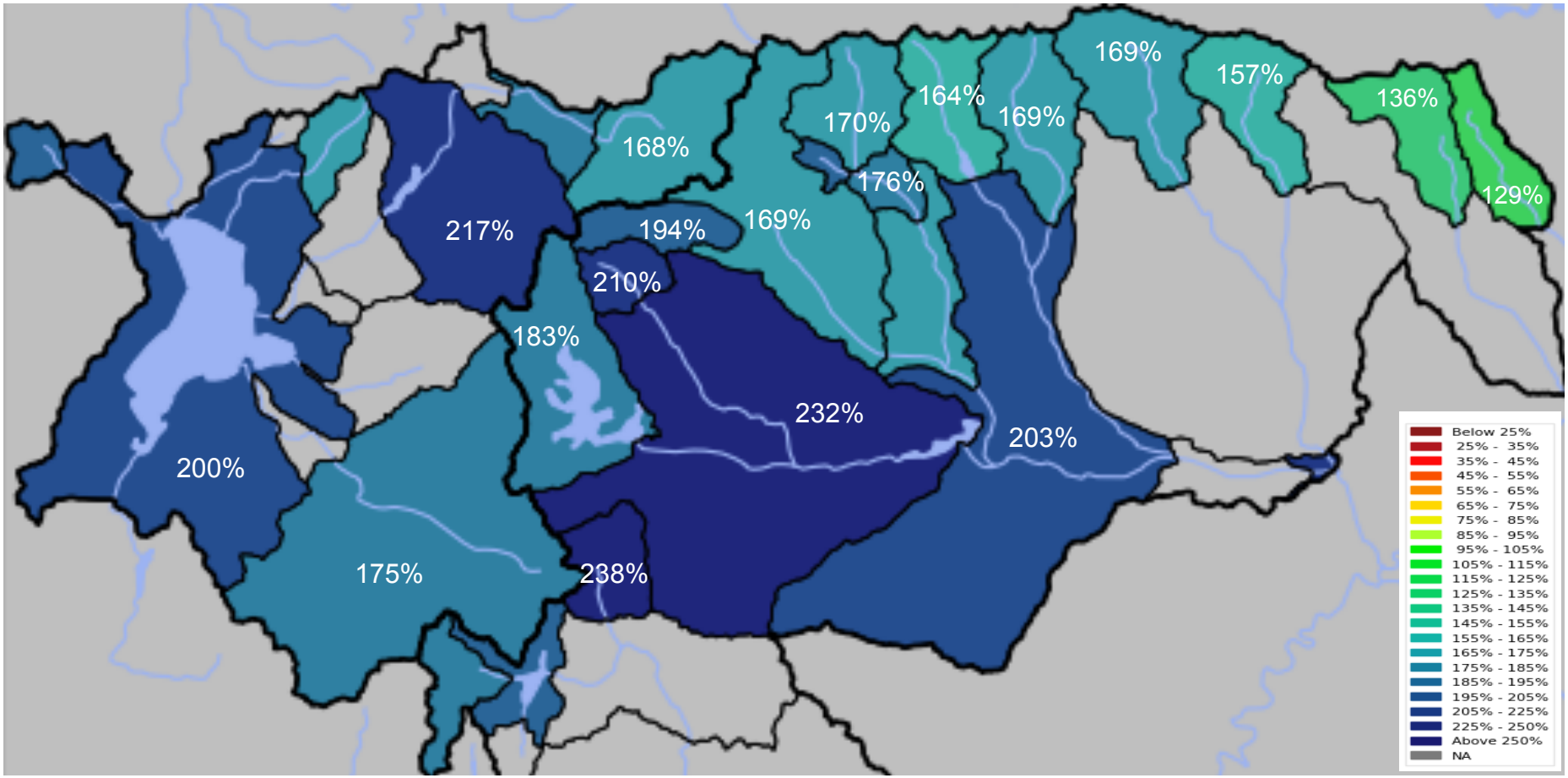

Colorado Basin River Forecast Center
LBNU1 - LAKEFORK BASIN
10,966 ft
Percent Median To Date: 188% (29.9 / 15.9)
Percent Seasonal Median: 136% (29.9 / 22.0)
Accumulation rate 0.0 in/day
averaged over last 3 days.
Past
Future
Snow Water Equivalent (in)
Percent Seasonal Median
Date
Median 1981-2010
2017
2016
2011
1986


Colorado Basin River Forecast Center
CWHU1 - CHEPETA
Percent Median To Date: 136% (16.2 / 11.9)
Percent Seasonal Median: 109% (16.2 / 14.8)
Melt rate -0.1 in/day
averaged over last 3 days.
10,592 ft
Past
Future
Snow Water Equivalent (in)
Percent Seasonal Median
Date
10-01 10-31 11-30 12-31 01-30 03-01 04-01 05-01 05-31 07-01 07-31 08-30 09-30
Median 1981-2010 2017 2016 2011 2005 1983


Colorado Basin River Forecast Center
KGCU1 - KINGS CABIN
Percent Median To Date: 144% (12.4 / 8.6)
Percent Seasonal Median: 119% (12.4 / 10.4)
Melt rate -0.1 in/day
averaged over last 3 days.
8,724 ft
Past
Future
Snow Water Equivalent (in)
Percent Seasonal Median
Date
10-01 10-31 11-30 12-31 01-30 03-01 04-01 05-01 05-31 07-01 07-31 08-30 09-30
Median 1981-2010 2017 2016 2005 1983 2011

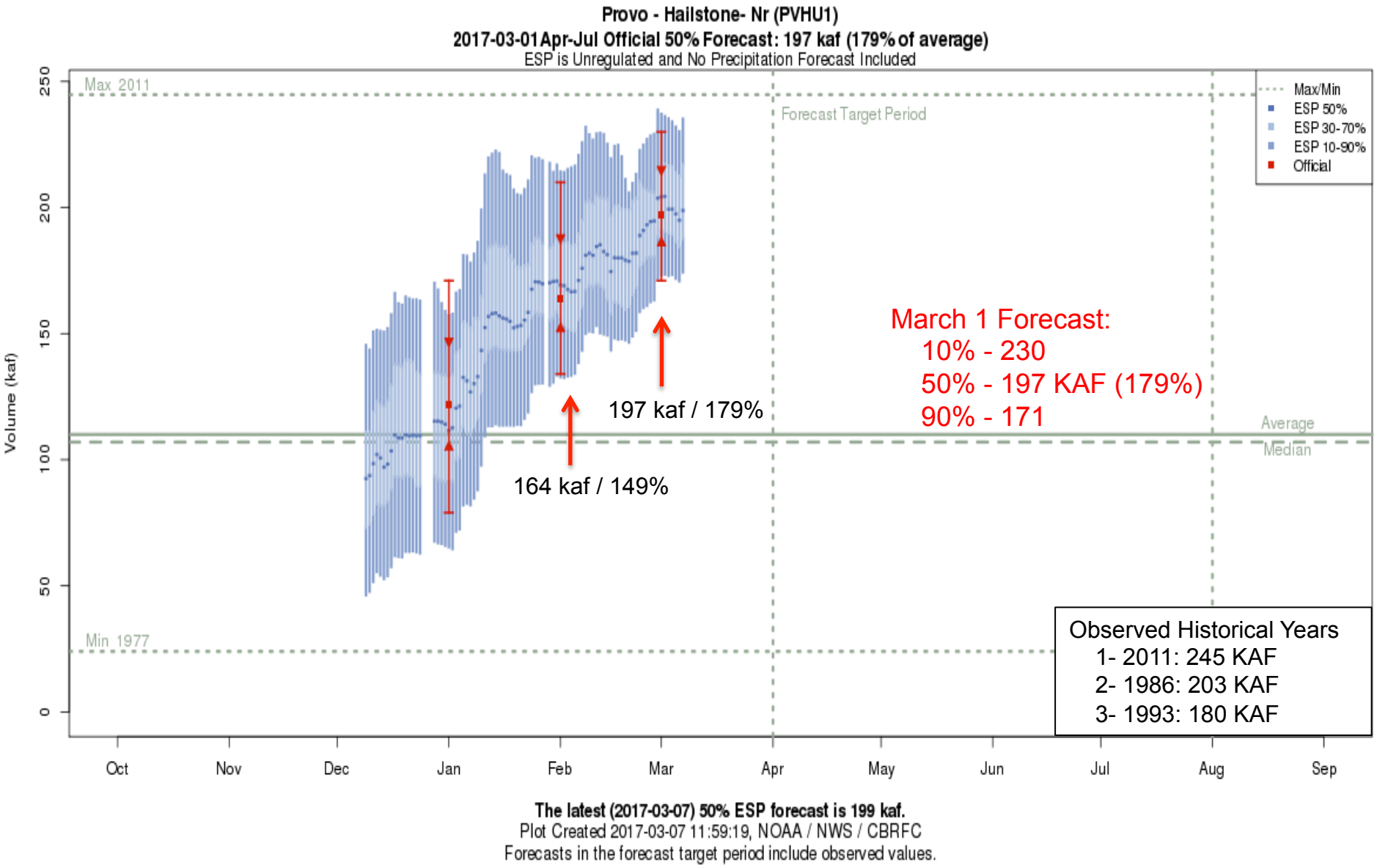
March 1st Water Supply Forecasts

April-July Forecast Streamflow Volumes
(% of 1981-2010 average)



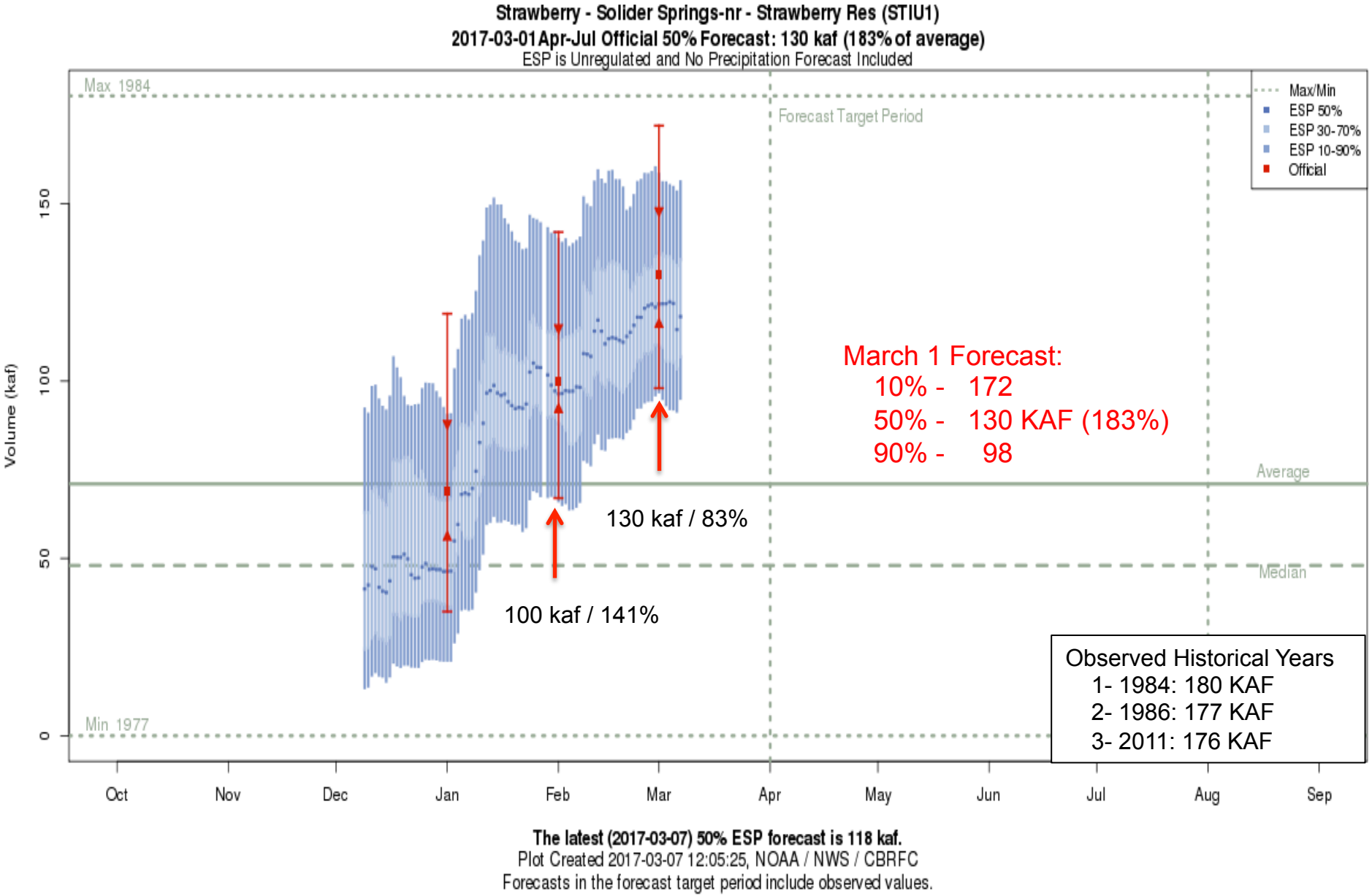
~15-50% of average increase in forecasts since Feb 1st

Forecasts: Provo nr Hailstone

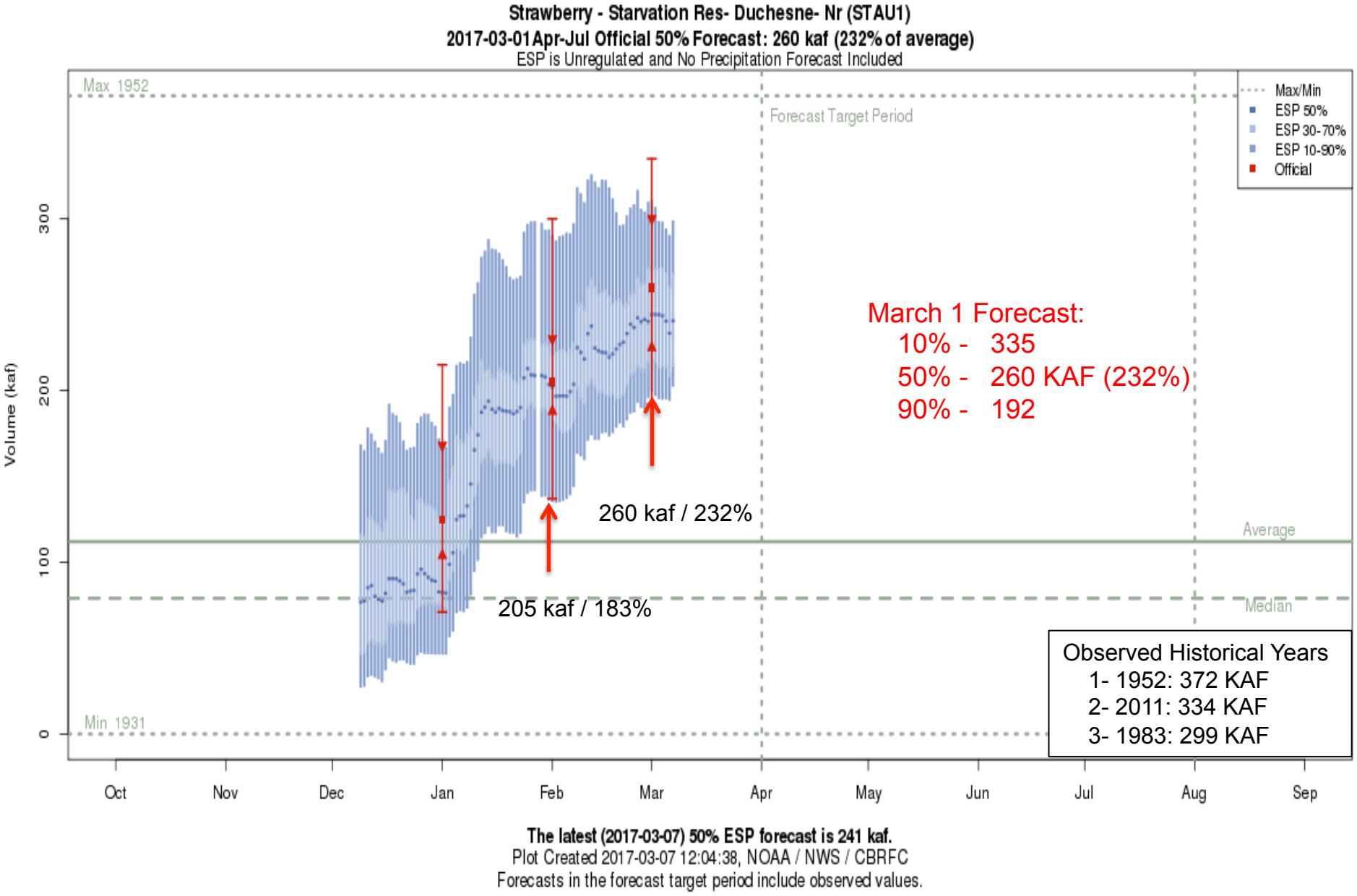


*50% exceedance probability assuming “average” weather into the future

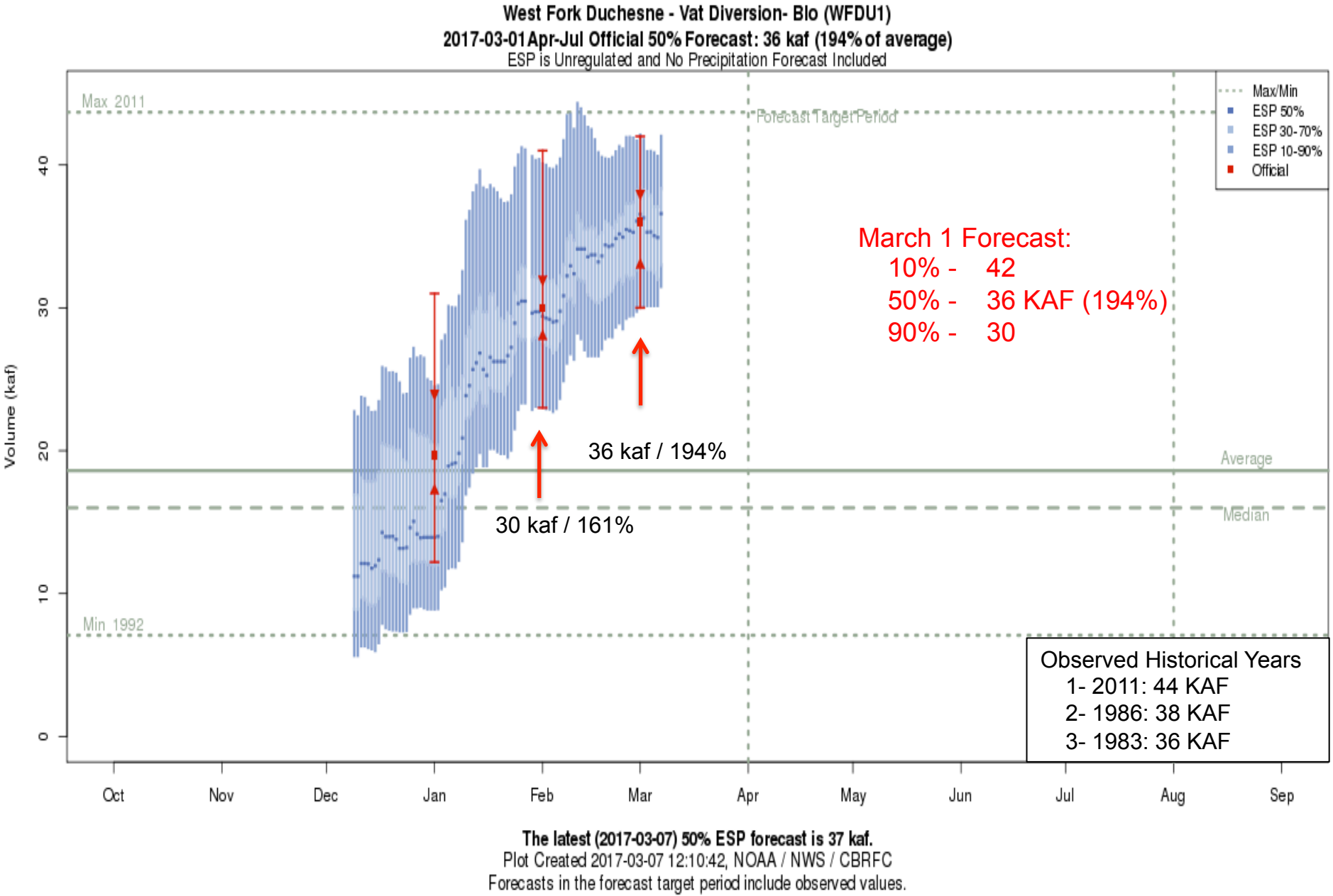
Forecasts: Strawberry nr Solider Springs



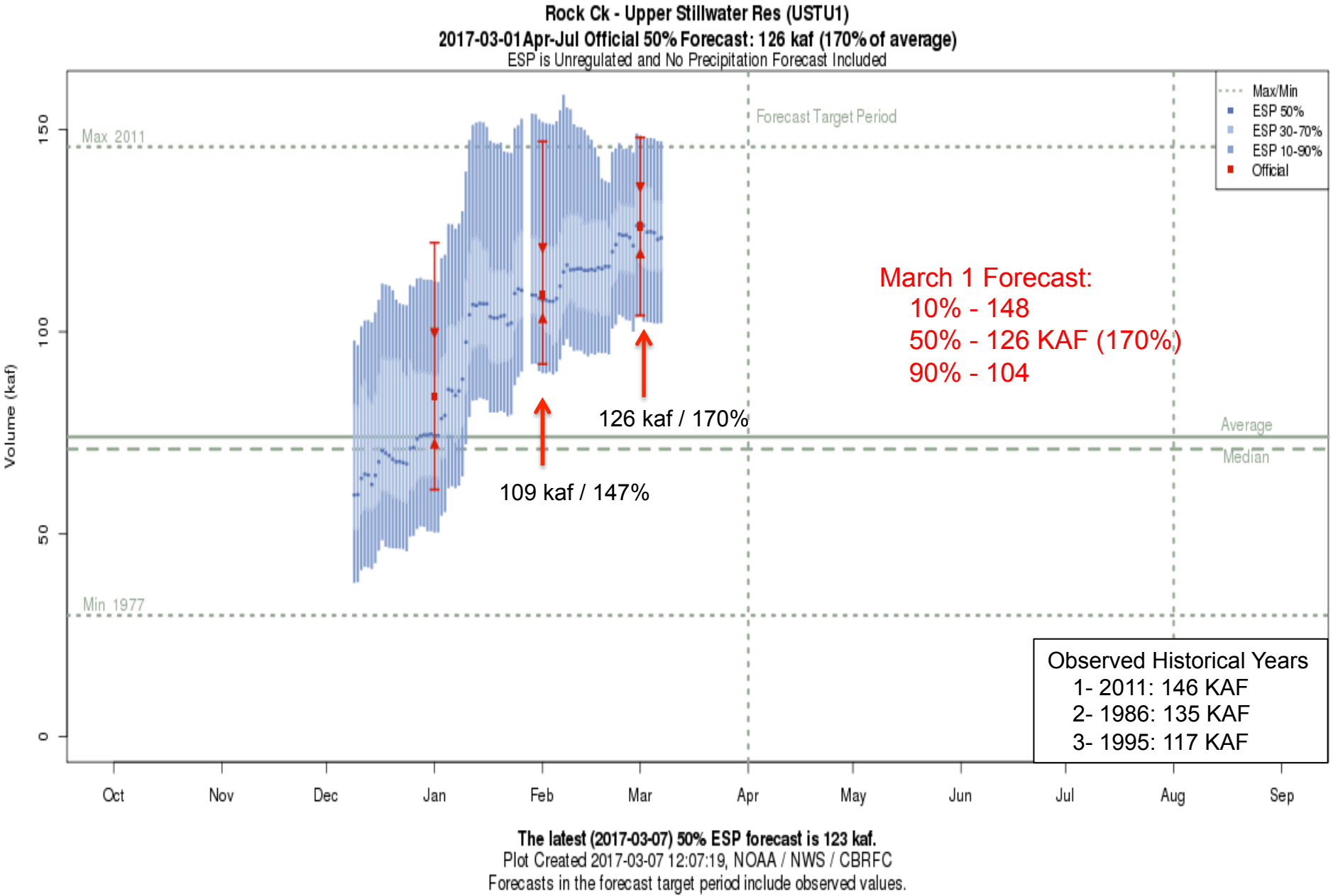
Forecasts: Starvation Reservoir



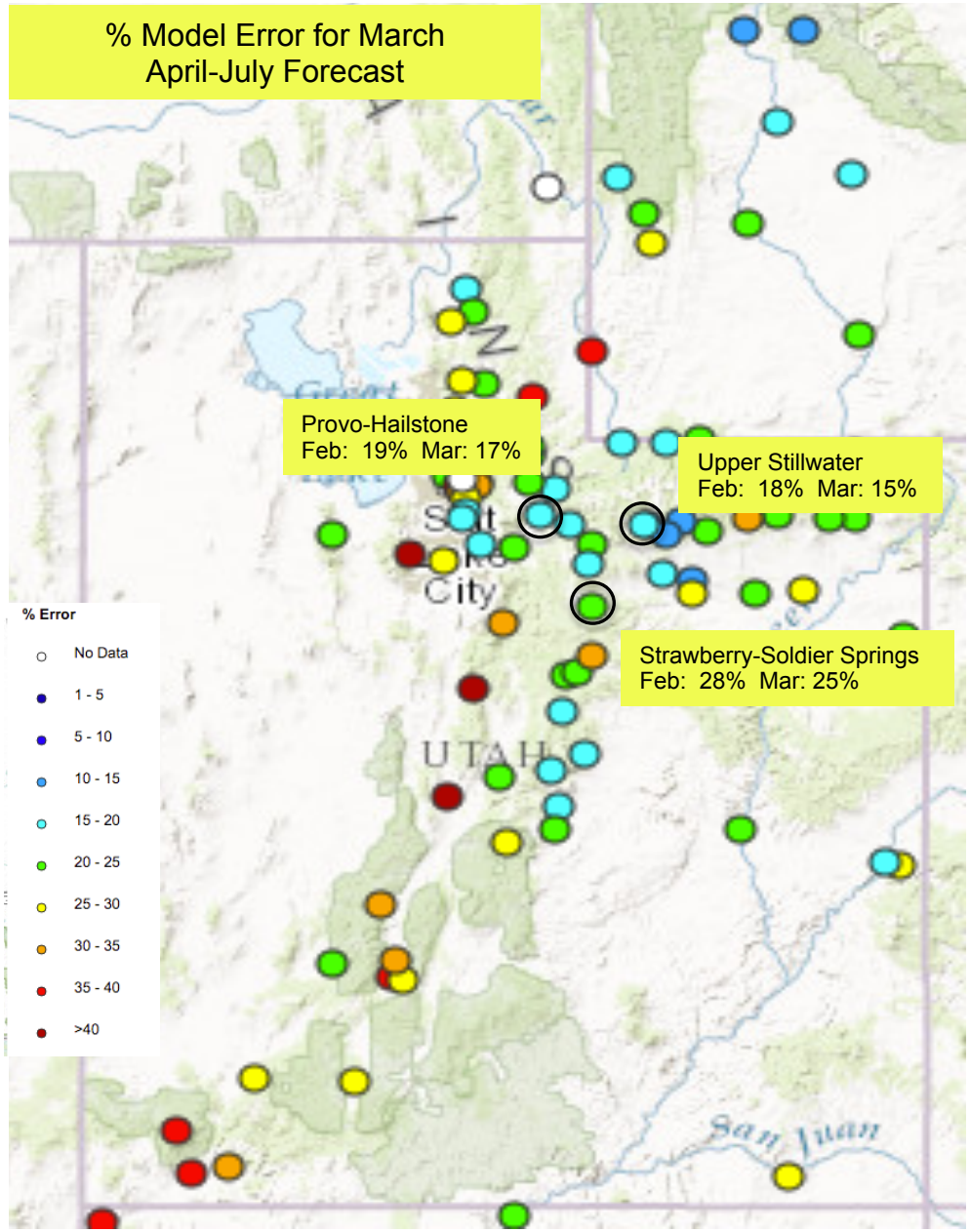
Forecasts: West Fork below Vat



Forecasts: Upper Stillwater Reservoir



Forecast Accuracy? How good are the 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*

Peak Flow Forecast Special Product

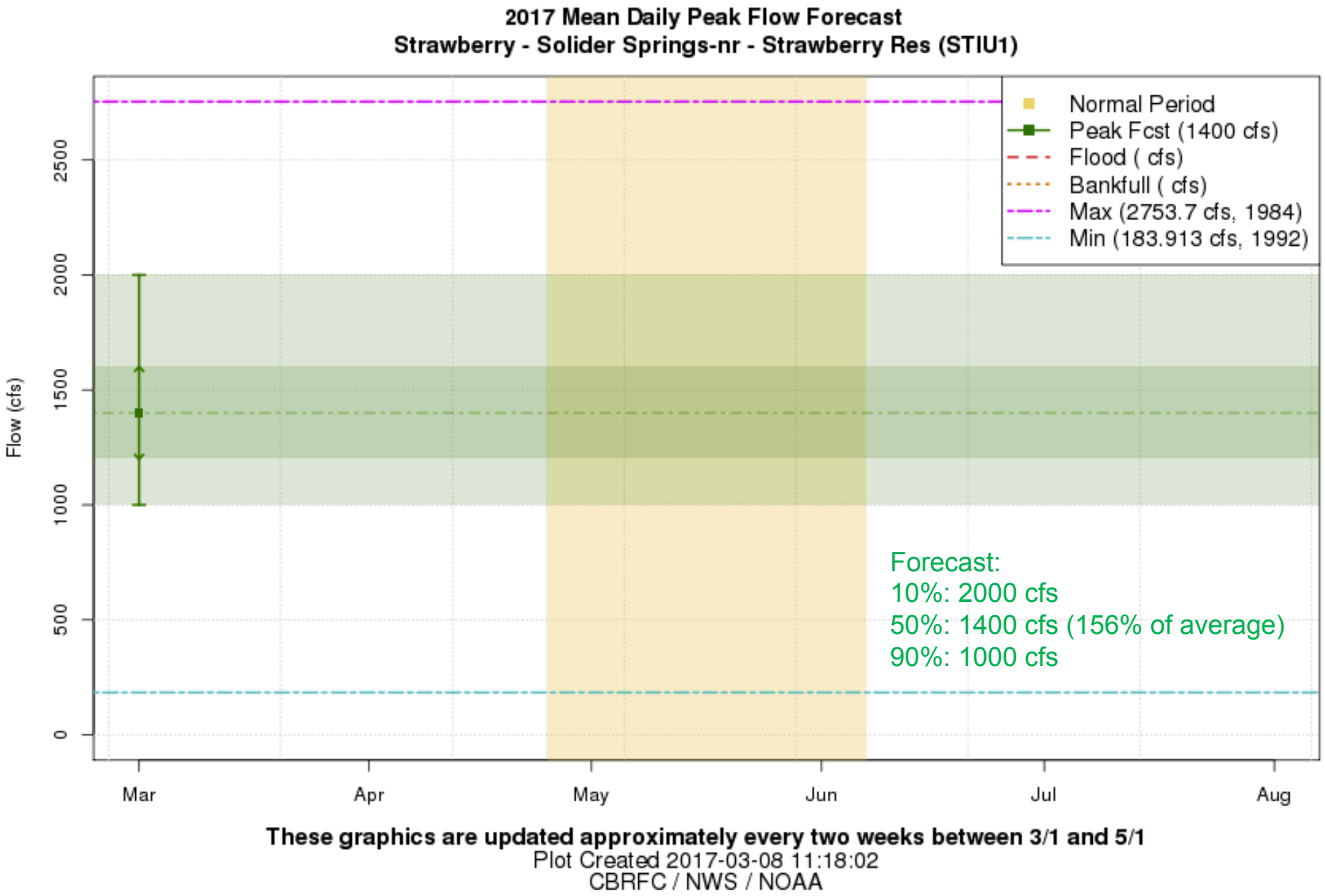
MEAN DAILY PEAK FLOW FORECASTS IN CFS
March 8, 2017

LOCATION	FLOOD FLOW	FCST DATE	FORECAST FLOWS 90%	75%	50%	25%	10%	TYPE
BIG BRUSH CK - VERNAL, NR, RED FLEET RES, ABV	-999	2017-03-01	200	250	300	350	450	UNREG
STRAWBERRY - SOLIDER SPRINGS,NR - STRAWBERRY	-999	2017-03-01	1000	1200	1400	1600	2000	UNREG
CURRANT CK - CURRANT CK RES	-999	2017-03-01	450	550	600	700	800	UNREG
STRAWBERRY - STARVATION RES, DUCHESNE, NR	-999	2017-03-01	800	900	1100	1400	1600	REG
STRAWBERRY - STARVATION RES, DUCHESNE, NR	-999	2017-03-01	2000	2500	3000	3500	4000	UNREG
WEST FORK DUCHESNE - VAT DIVERSION, BLO	721	2017-03-01	250	300	400	500	600	REG
WEST FORK DUCHESNE - VAT DIVERSION, BLO	721	2017-03-01	350	450	500	600	900	UNREG
DUCHESNE - TABIONA, NR	2730	2017-03-01	1000	1200	1500	1800	2200	REG
DUCHESNE - TABIONA, NR	2730	2017-03-01	1600	1800	2000	2300	2700	UNREG
ROCK CK - UPPER STILLWATER RES	-999	2017-03-01	1400	1600	1800	2400	3000	UNREG
DUCHESNE - DUCHESNE, NR, KNIGHT DIV, ABV	-999	2017-03-01	1800	2400	3000	3800	4500	REG
DUCHESNE - DUCHESNE, NR, KNIGHT DIV, ABV	-999	2017-03-01	3000	3500	4000	5000	6000	UNREG
PROVO - WOODLAND, NR	3098	2017-03-01	1967	2248	2518	2860	3730	REG
PROVO - WOODLAND, NR	3098	2017-03-01	1685	2240	2260	2460	3111	UNREG

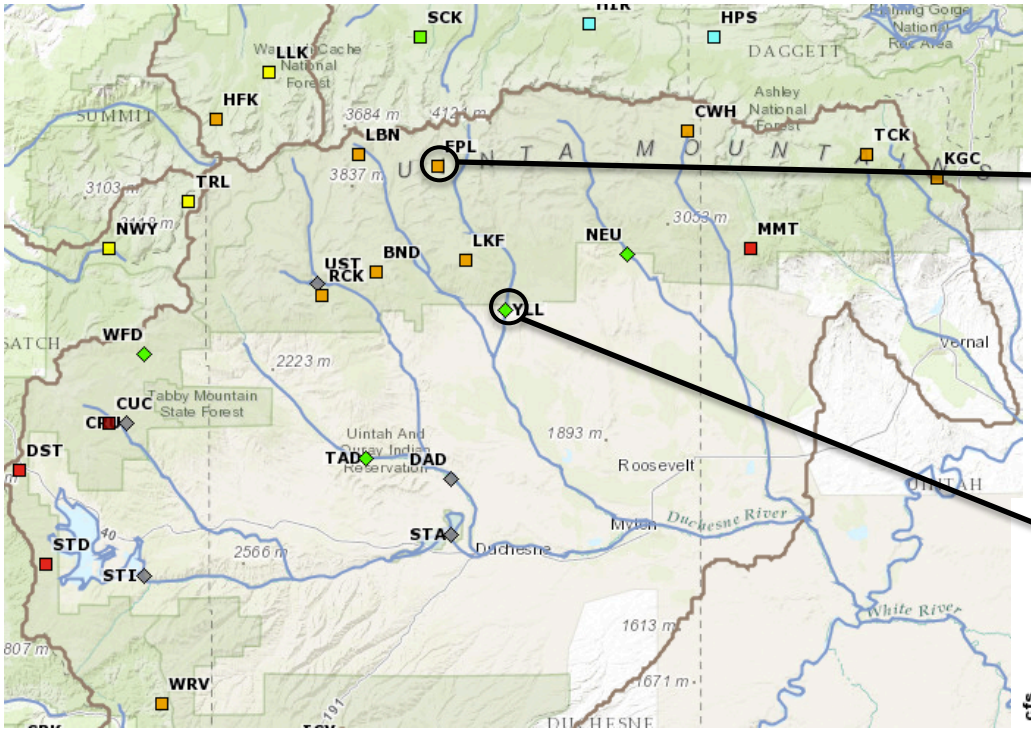
UNREG= Peak flow forecasts are unregulated and do not account for upstream diversions/regulation.
REG= Peak flow forecasts are regulated based on assumptions of upstream diversions/regulations.
FLOOD= Flood flow. -9999 = no flood flow
Regulated flow at Provo-Woodland includes diversions from the Duchesne Tunnel whereas unregulated flows do not.

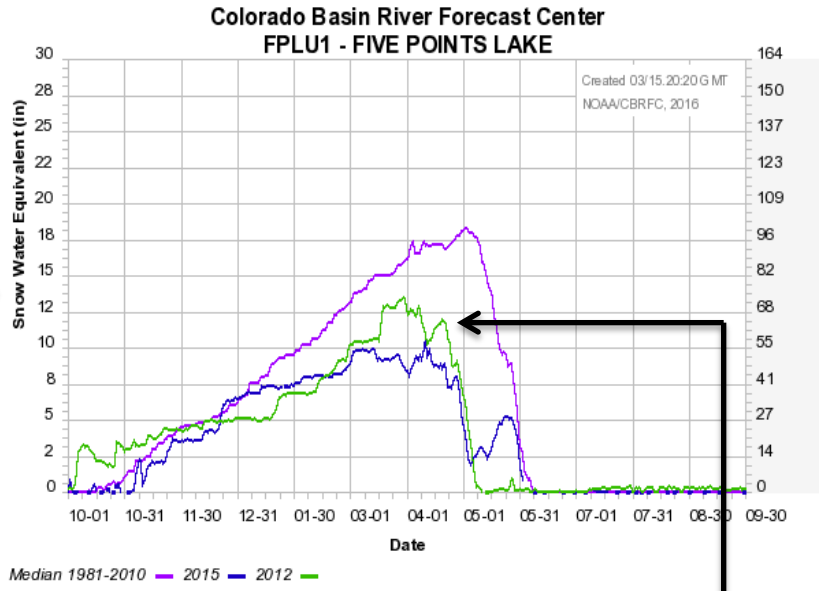
- Do not provide a specific date of the peak forecast
  - May only have a 5-10 day lead time for timing the peak
  - Prior to that we provide the average time period of the peak

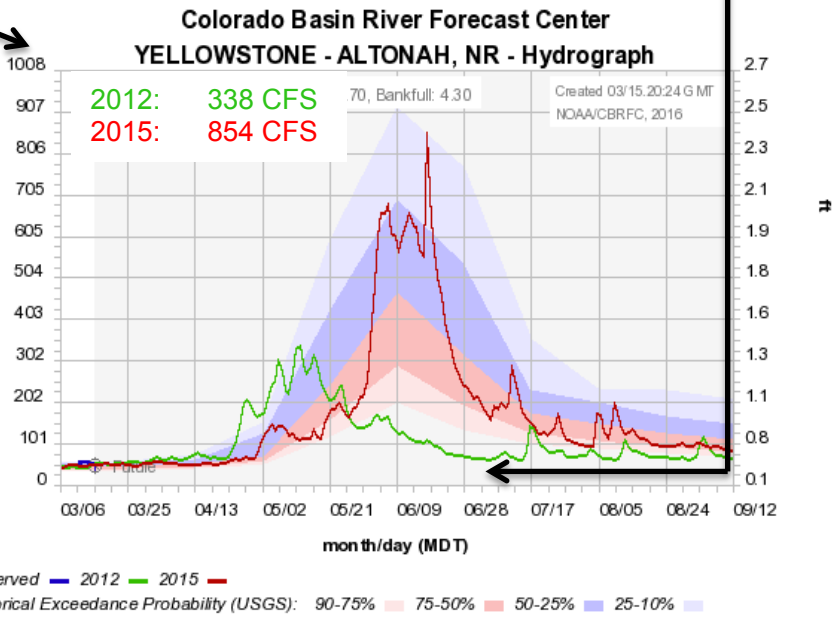
Peak Flow Forecast: Strawberry nr Solider Springs



Peak Flow Forecasts: Spring Weather Impacts

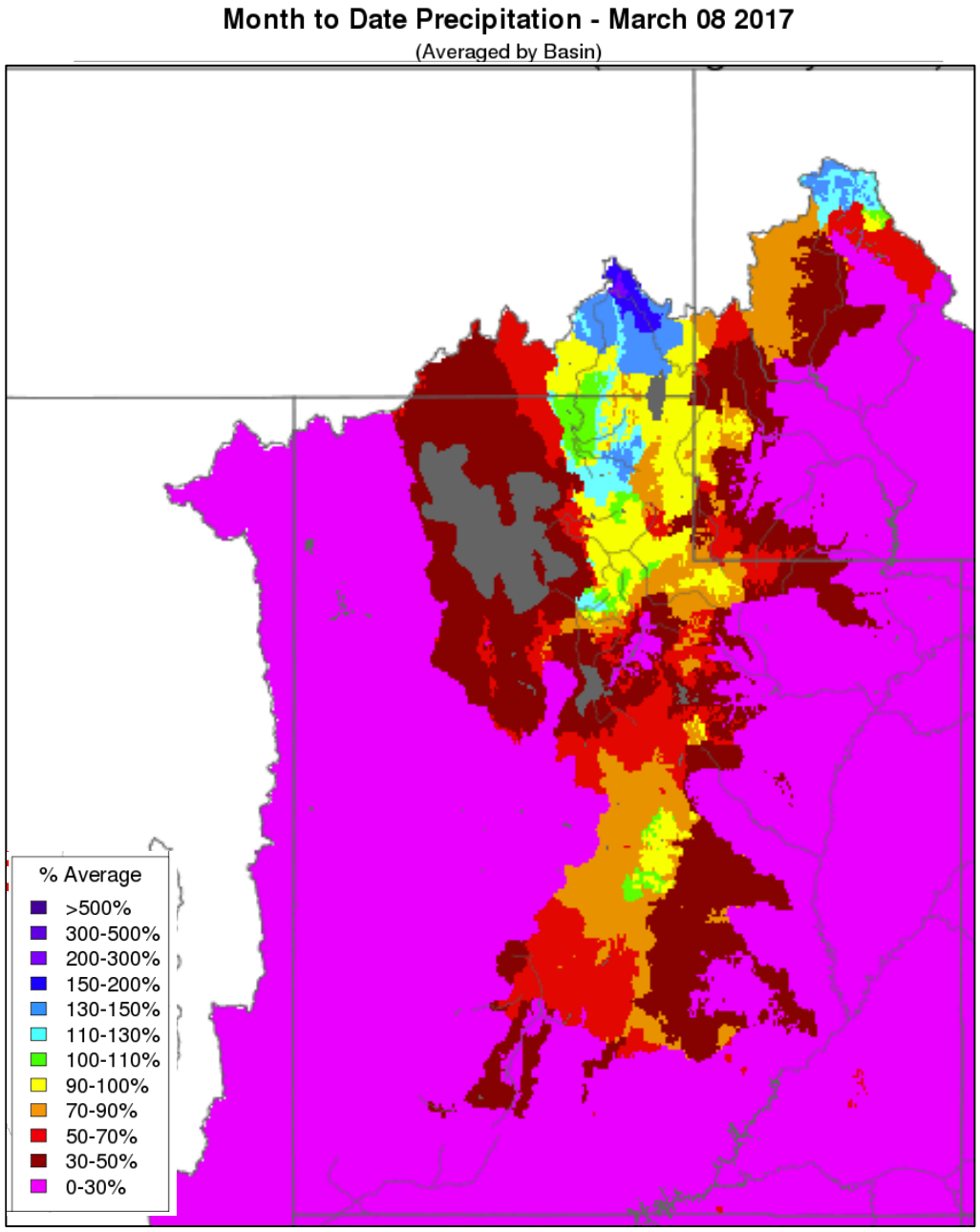






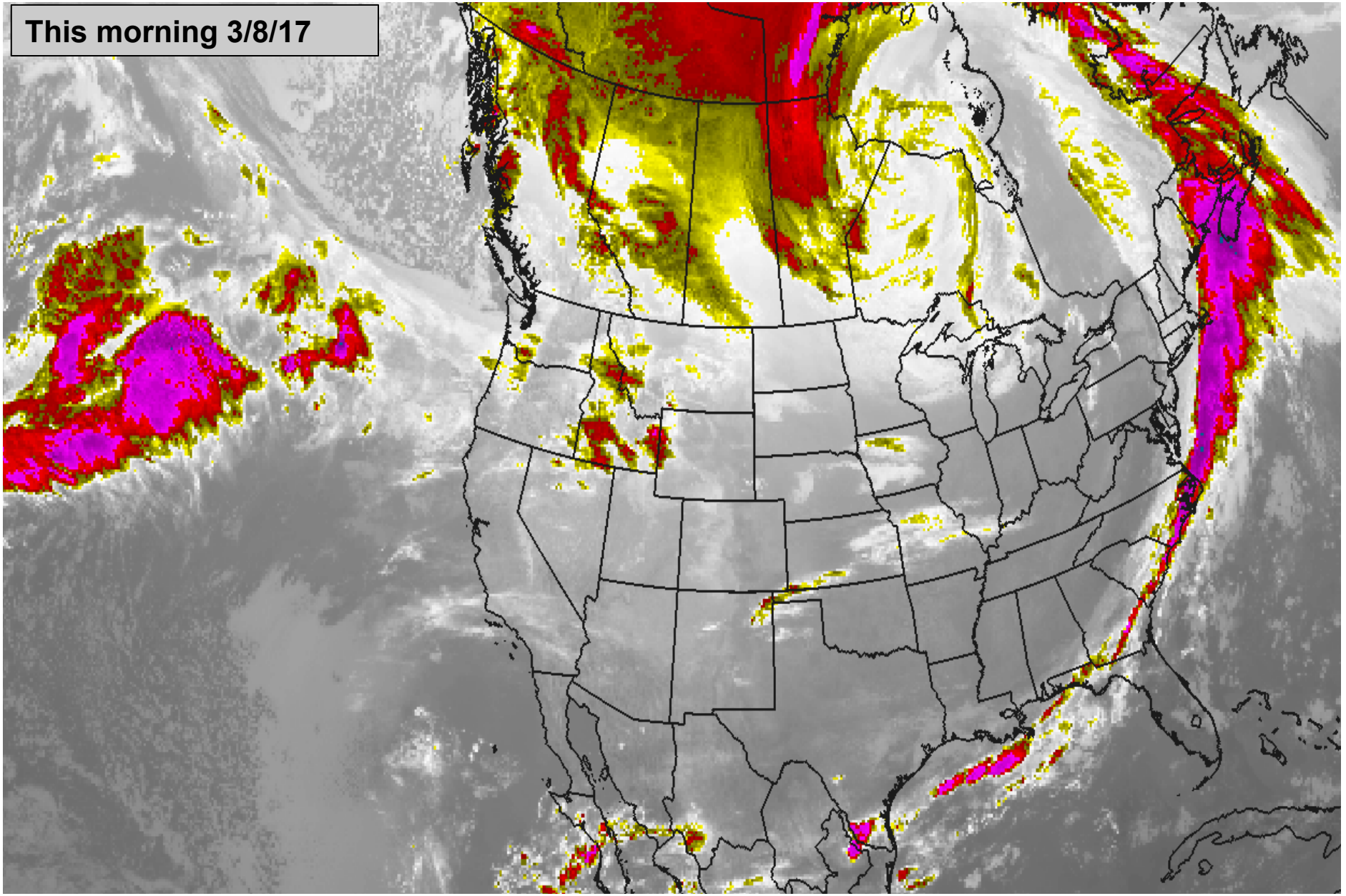
- Long lead peak flow forecast try to capture the range of possibilities but will not capture all spring scenarios
- Use daily forecast hydrographs as peak nears
  - Include forecasted precipitation and temperature

March Weather: Precipitation so far….



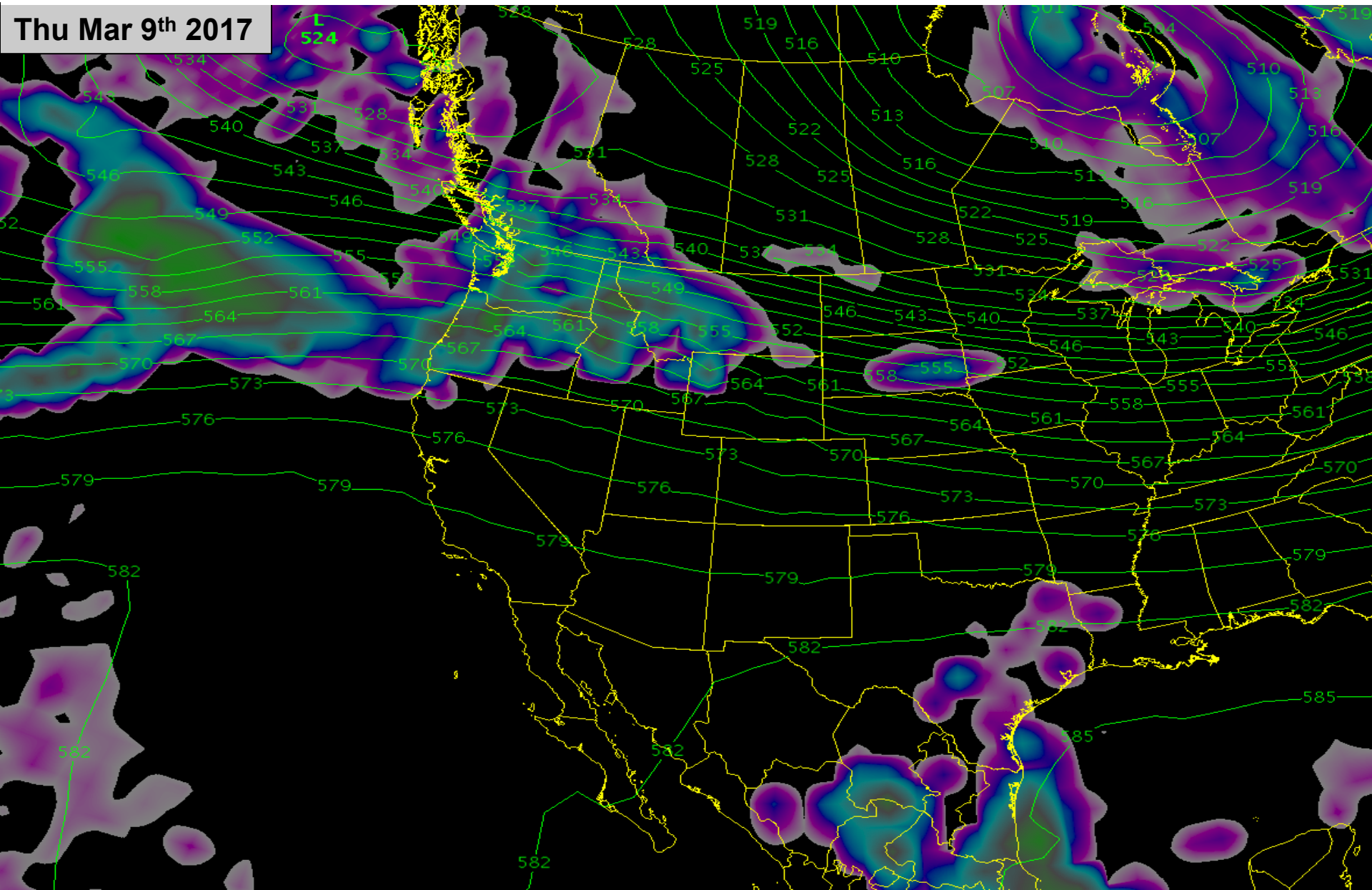
Upcoming Weather and Impacts to Water Supply Forecasts

Westerly flow over the area with storm track to the north



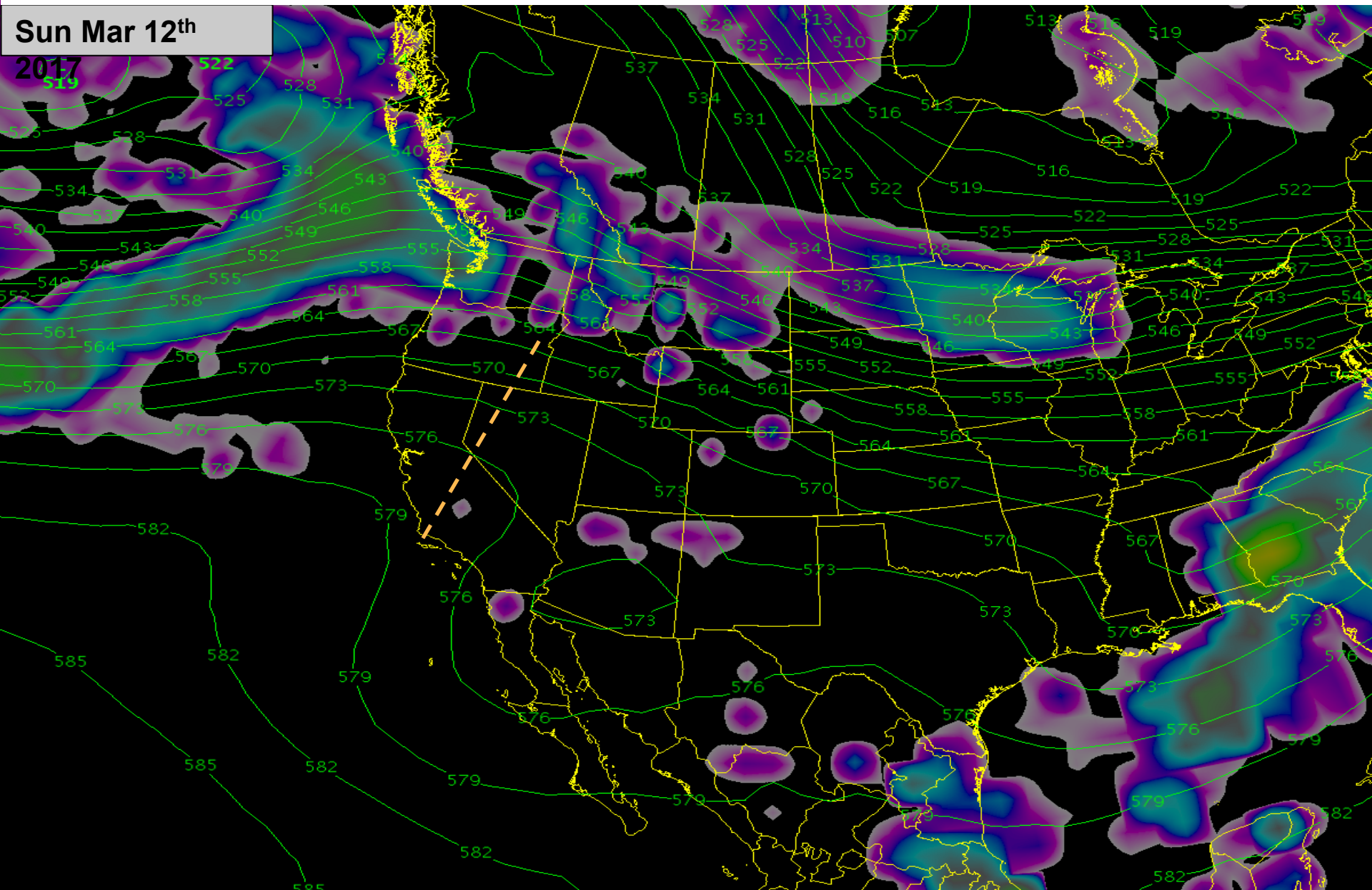
Upcoming Weather and Impacts to Water Supply Forecasts

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



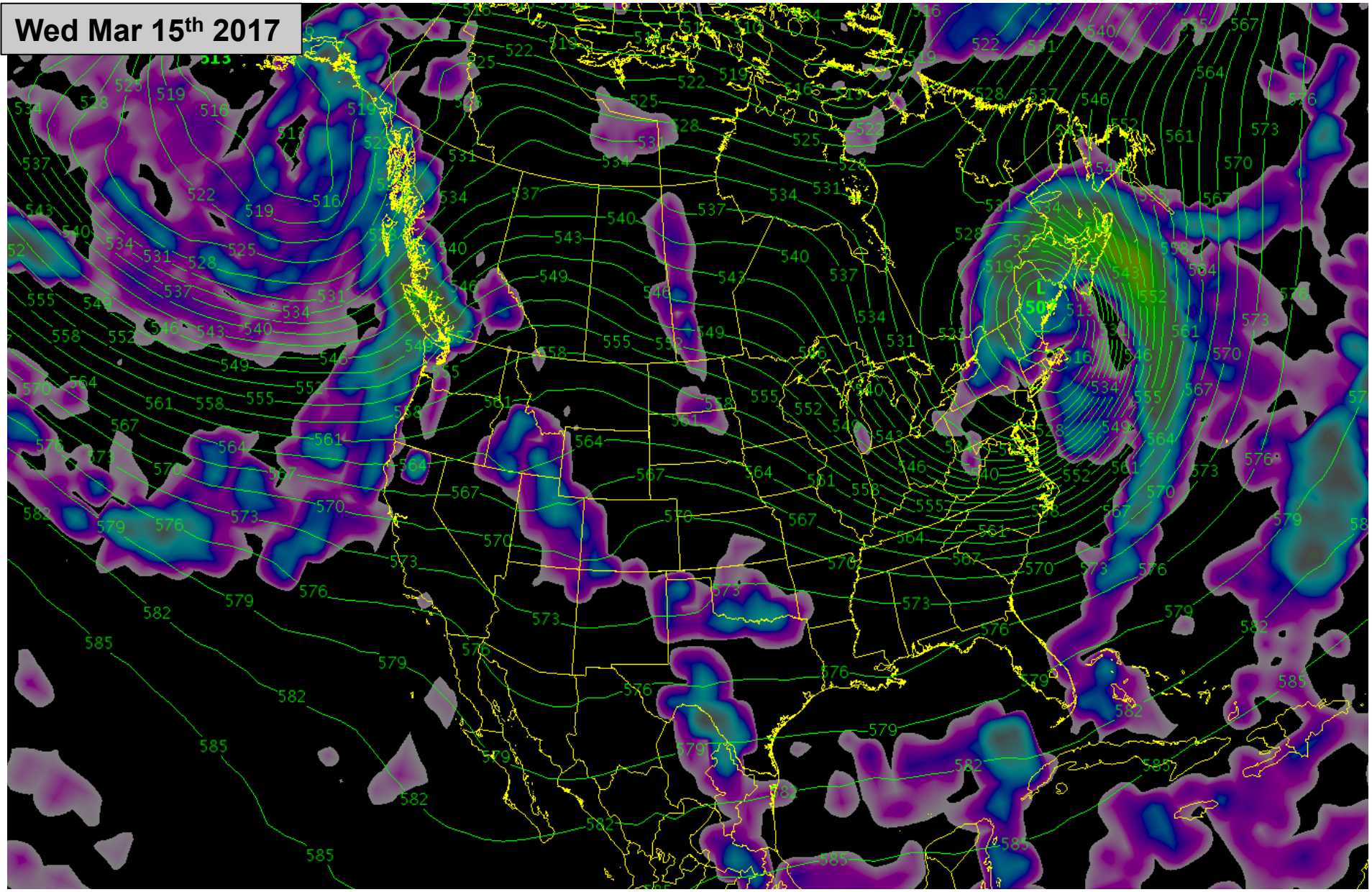
Upcoming Weather and Impacts to Water Supply Forecasts

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.



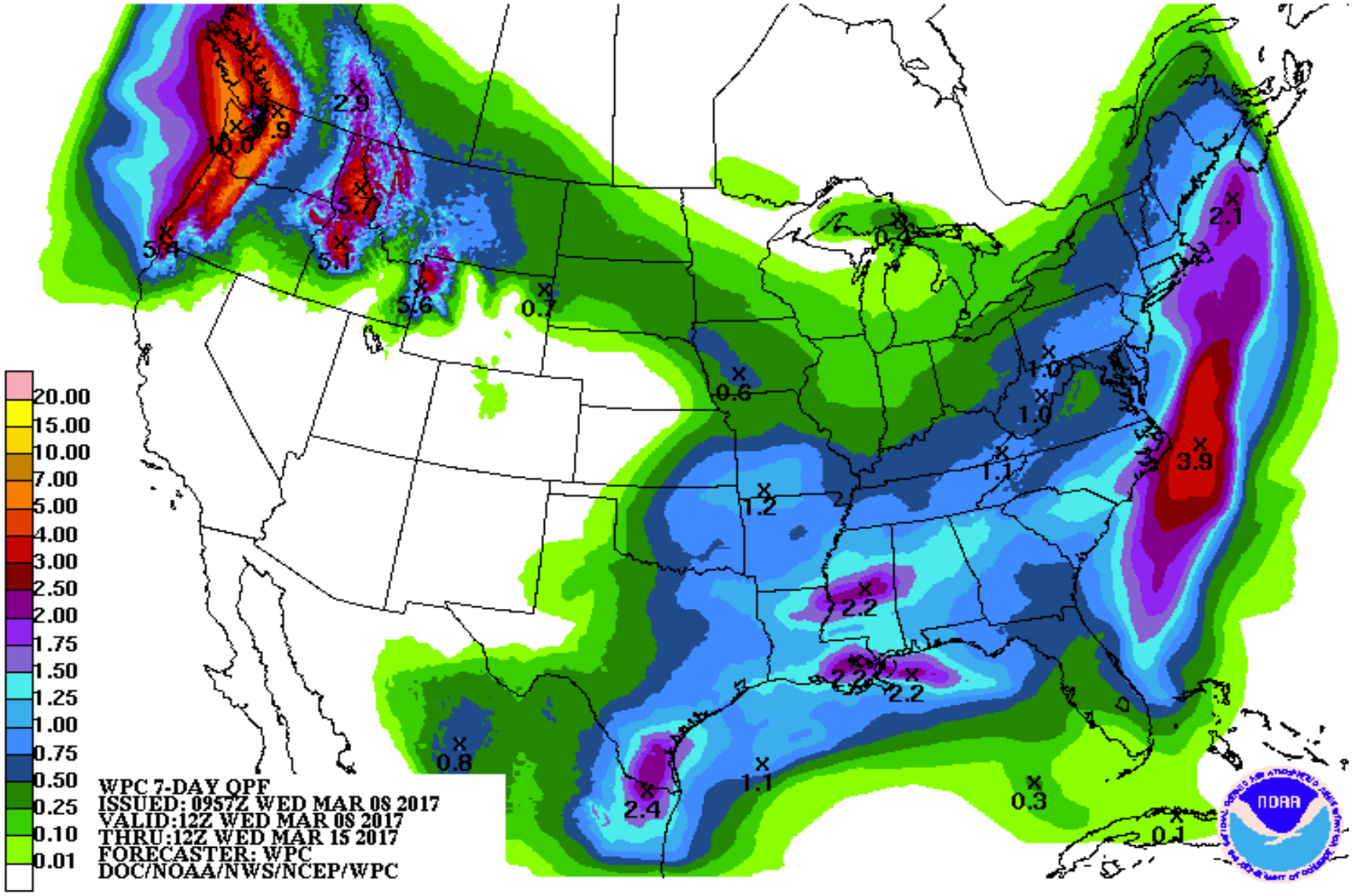
Upcoming Weather and Impacts to Water Supply Forecasts

The next legitimate threat for any significant precipitation looks to be the middle of next week. Model solutions are changing from day to day.



Upcoming Weather and Impacts to Water Supply Forecasts

Precipitation Forecast: 7 day total (Mar 8th-Mar 15th)



Discussion

Today's summary:

- Another much above average month precipitation on top of a wet Dec-Jan
- Significant runoff expected in Duchesne and Provo River Basins
- **March and April weather are critical**
- Even if conditions turn dry likely to see above average runoff
- March is starting off dry and will most likely be below average through the middle of the month
- Water supply forecasts will likely trend lower by mid-month
- Above average peak flows expected

- Forecast Discussion
- Operations Discussion
  - We can use future reservoir release and diversion schedules
    - cbrfc.operations@noaa.gov and Ashley

- Next briefing date?
  - Week of April 10th?