

CBRFC April 2017 CUWCD Briefing

1pm April 11, 2017

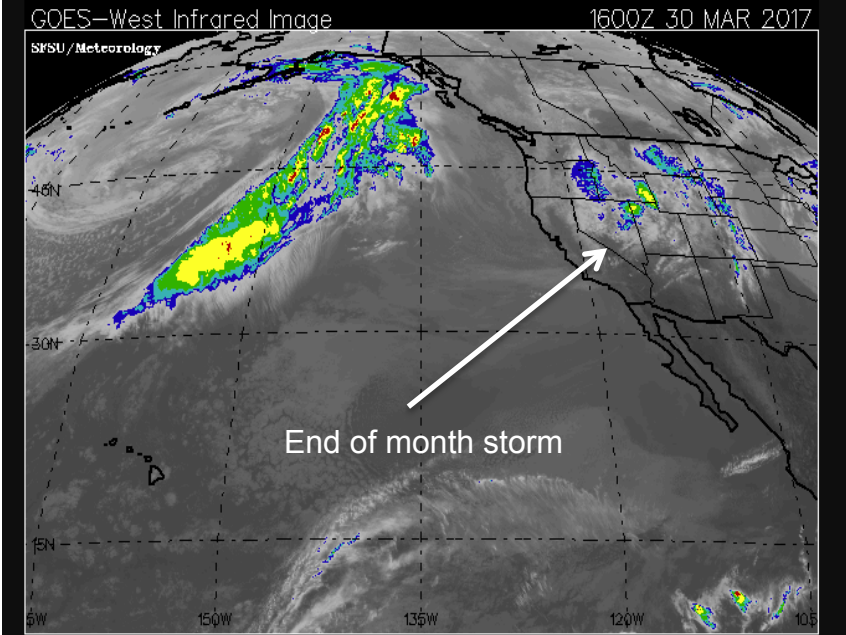
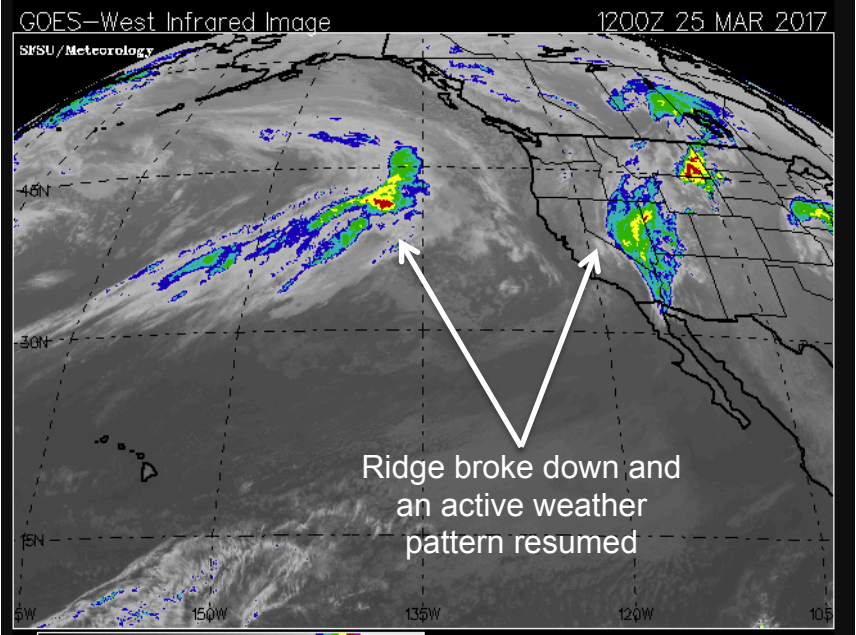
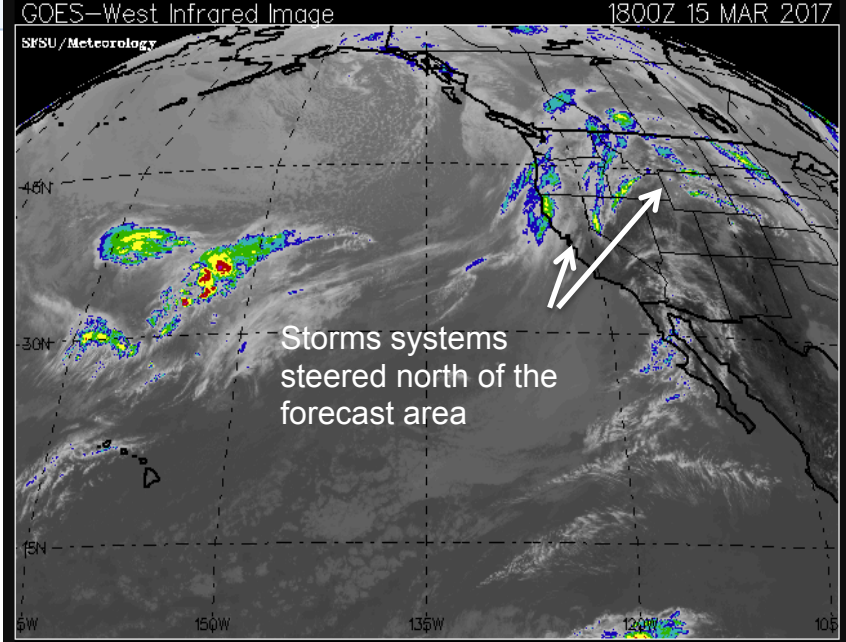
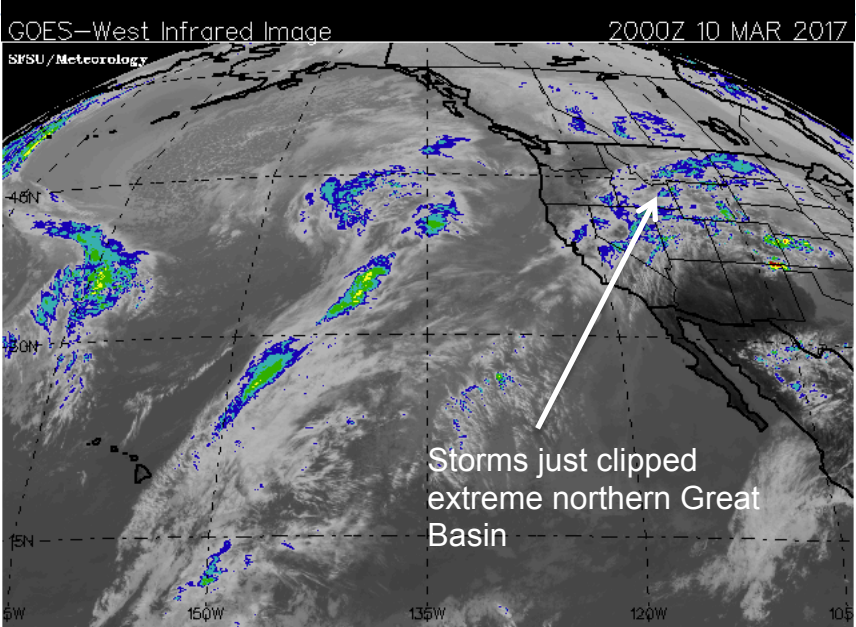
Ashley Nielson

Senior Hydrologist

Today's Presentation

- March Weather
 - Warm month
 - Melting snow, record flows, & saturated soils
- Snowpack conditions:
 - Low and mid elevation (<8500) snowmelt
 - Significant snow remains at higher elevation areas
- April 2017 Water Supply Forecast Overview
 - Some runoff was pushed into March
 - Forecast trends over the last month
- April forecasts-How good are they?
- Peak Flow Forecasts
- Upcoming Weather

March Weather



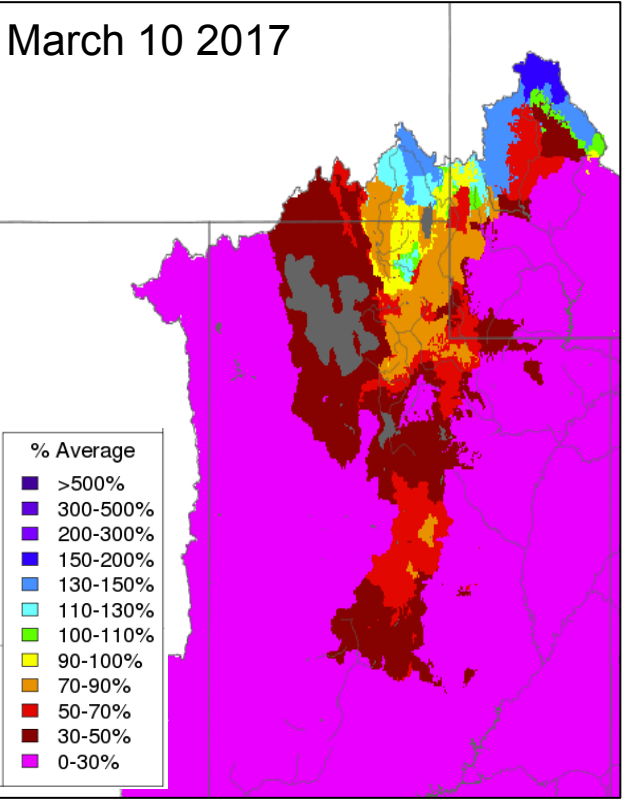
March Weather: Precipitation distribution over the month

Storms clipped only the extreme northern part of the area during early March

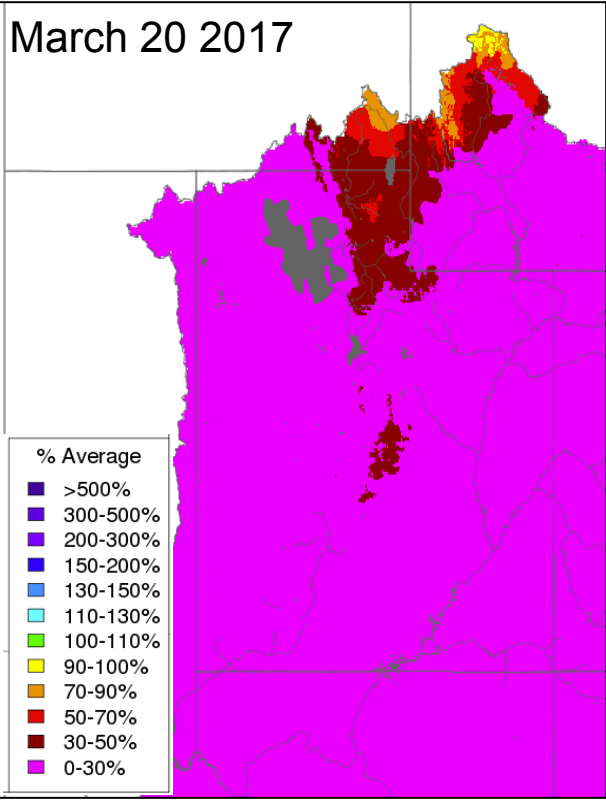
Extended period of dry conditions throughout the area during the middle part of the month

Significant precipitation the final 7-10 days of March

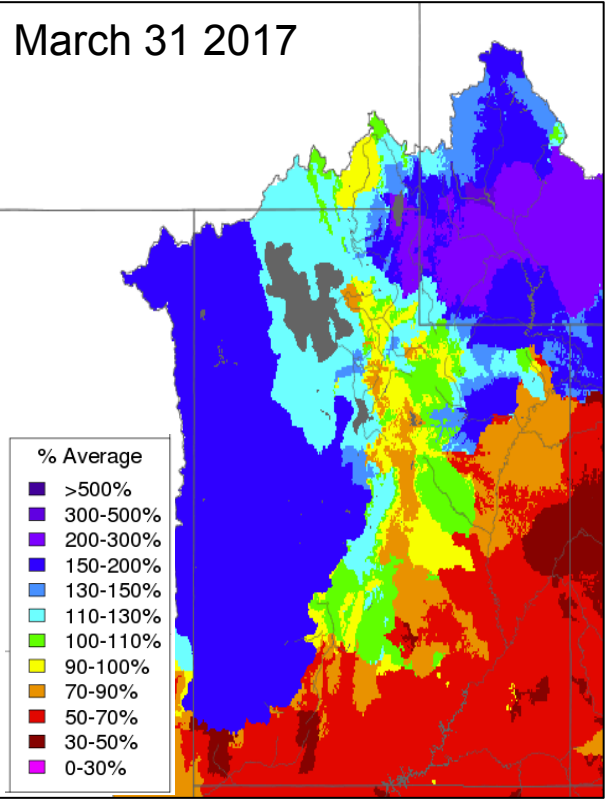
March 10 2017



March 20 2017

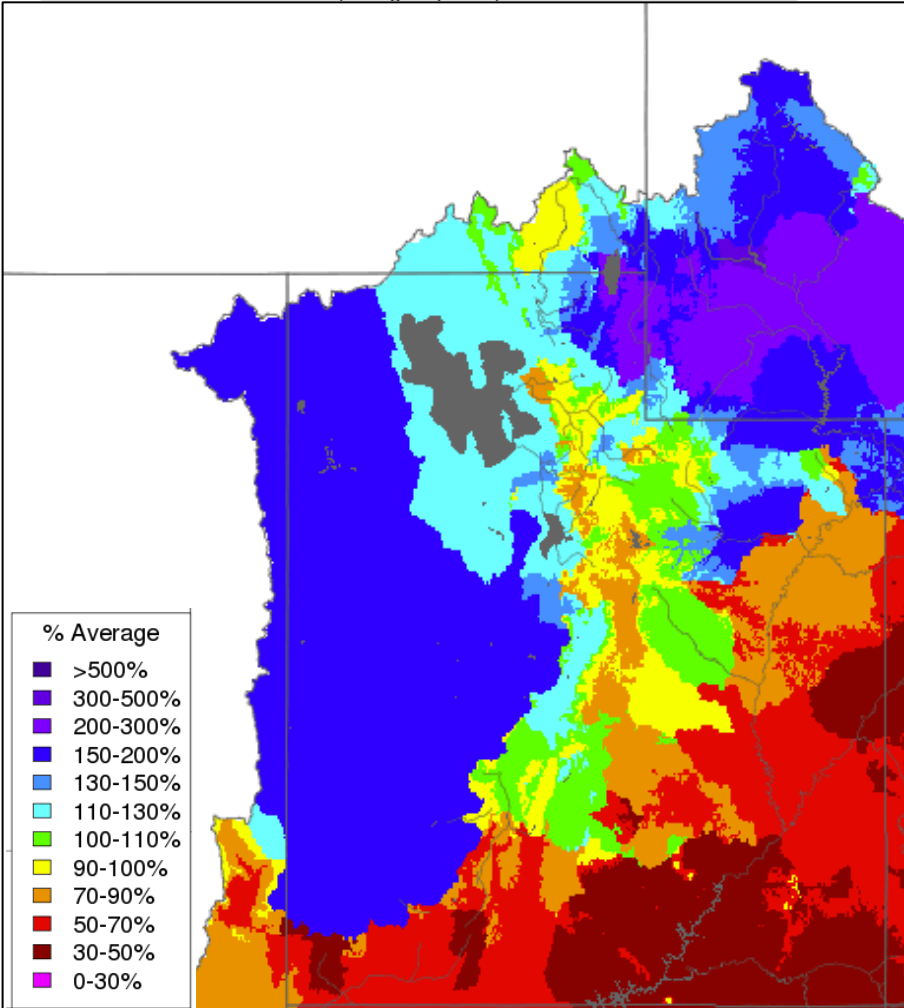


March 31 2017



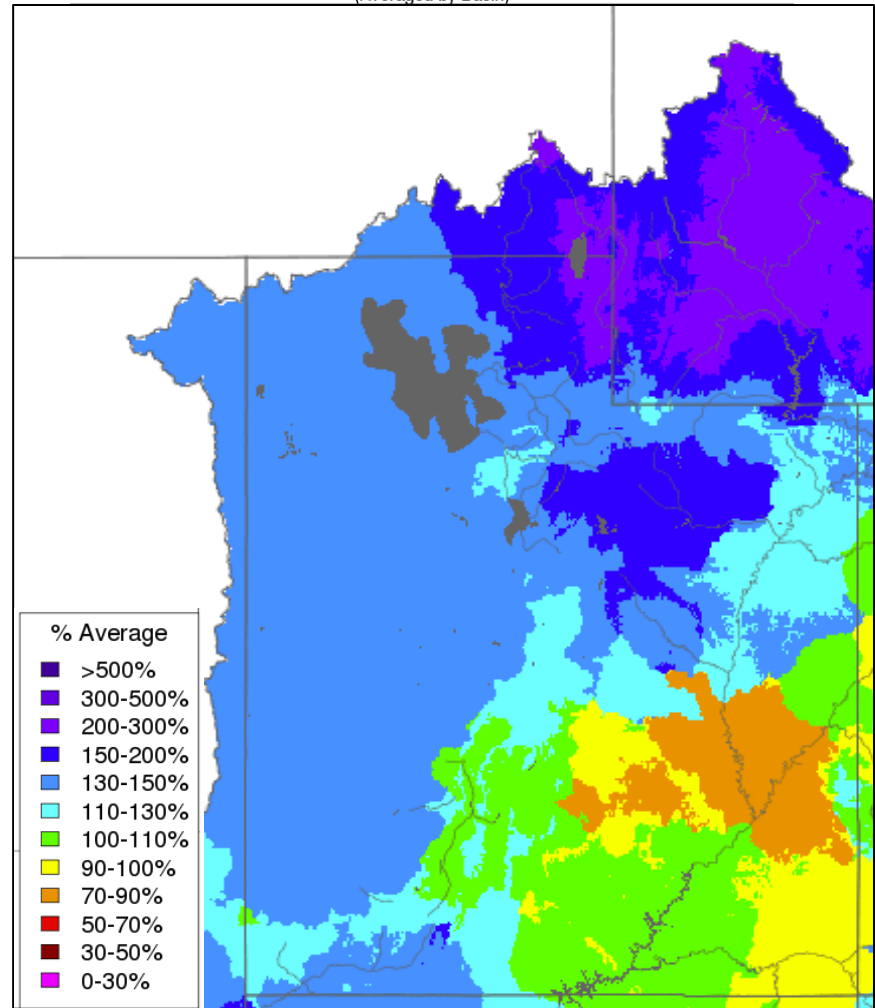
March Weather: Precipitation

Monthly Precipitation - March 2017
(Averaged by Basin)



Duchesne: 110%
Provo: 95%

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



Duchesne: 150%
Provo: 150%

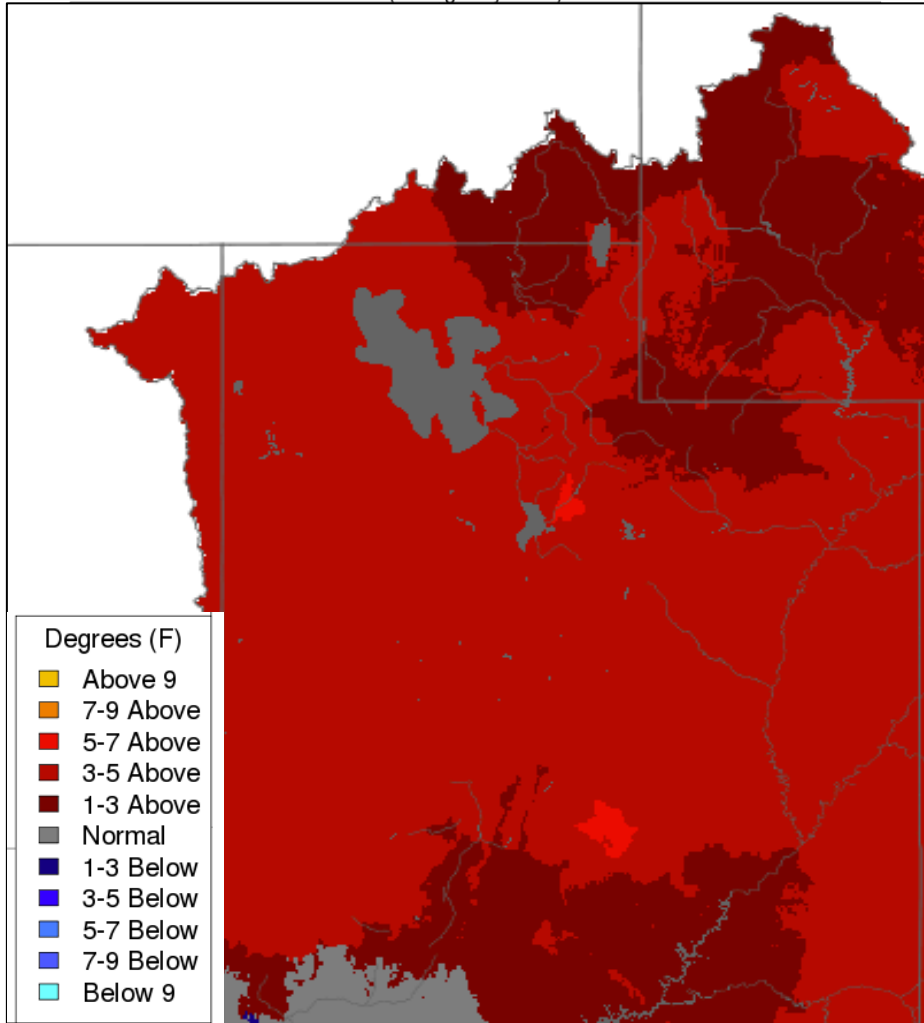
March Weather: Temperature

Another Warm Month

Some mean daily temperatures reached 15-25 degrees above average

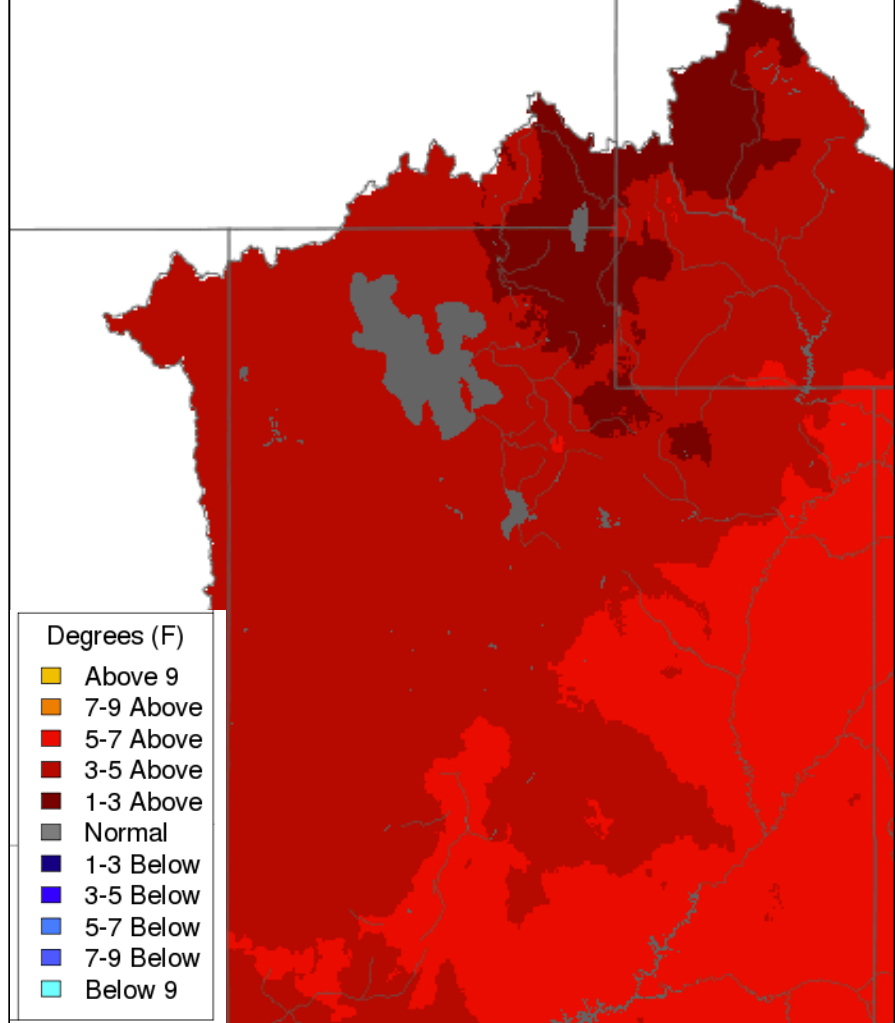
Max Temp - Monthly Deviation - February 2017

(Averaged by Basin)



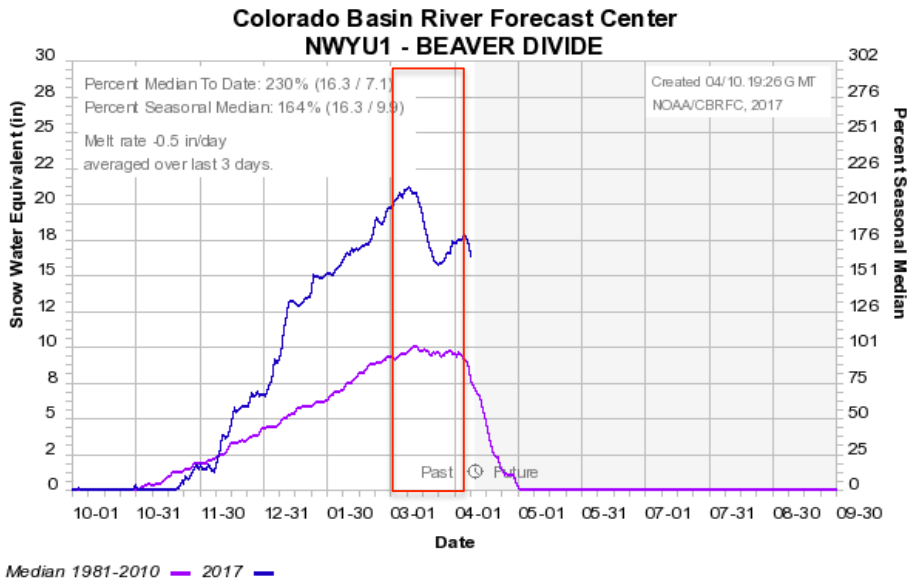
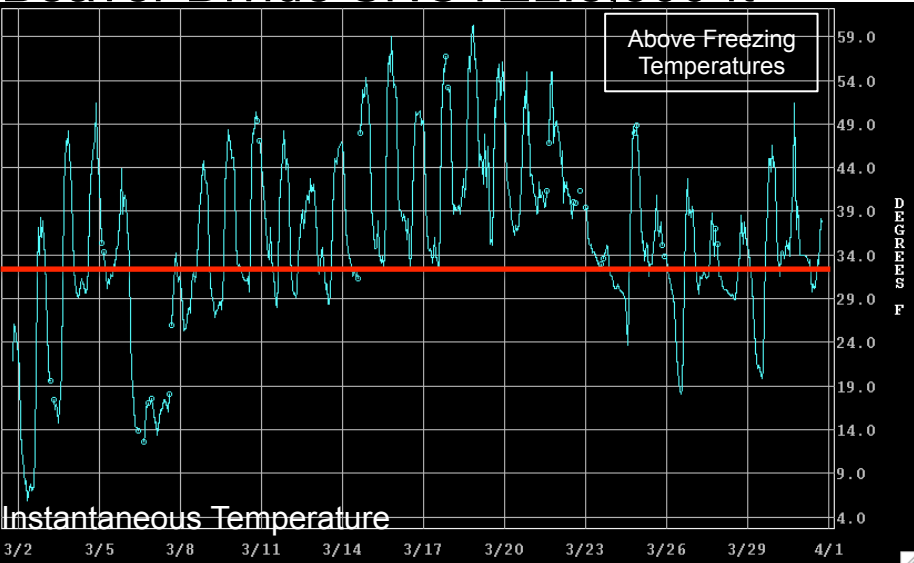
Max Temp - Monthly Deviation - March 2017

(Averaged by Basin)

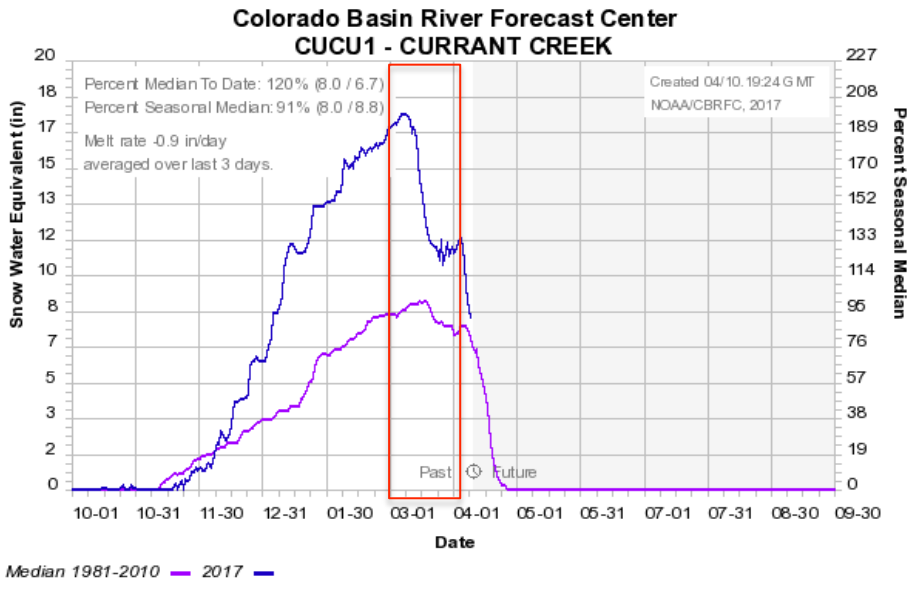
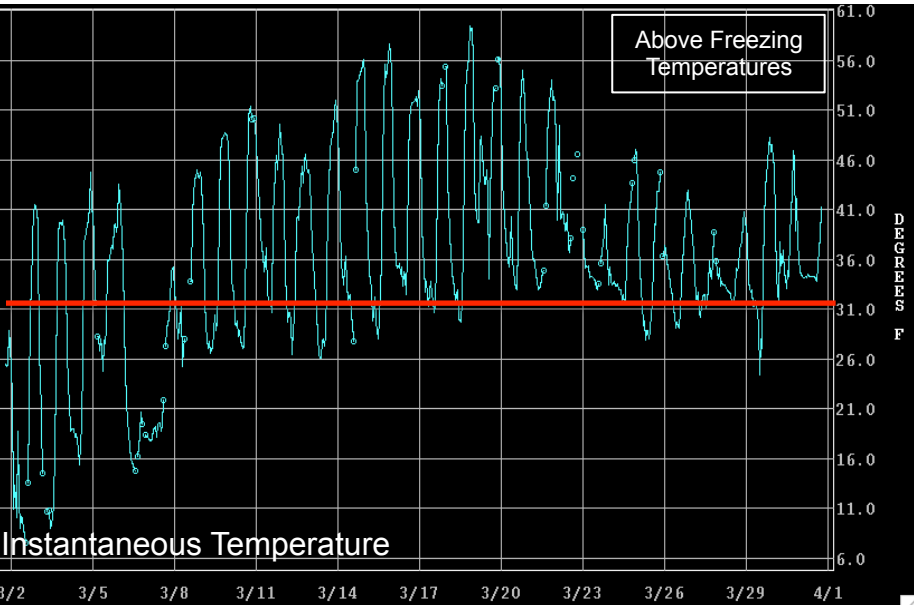


March Weather: Temperature

Beaver Divide SNOTEL: 8,300 ft

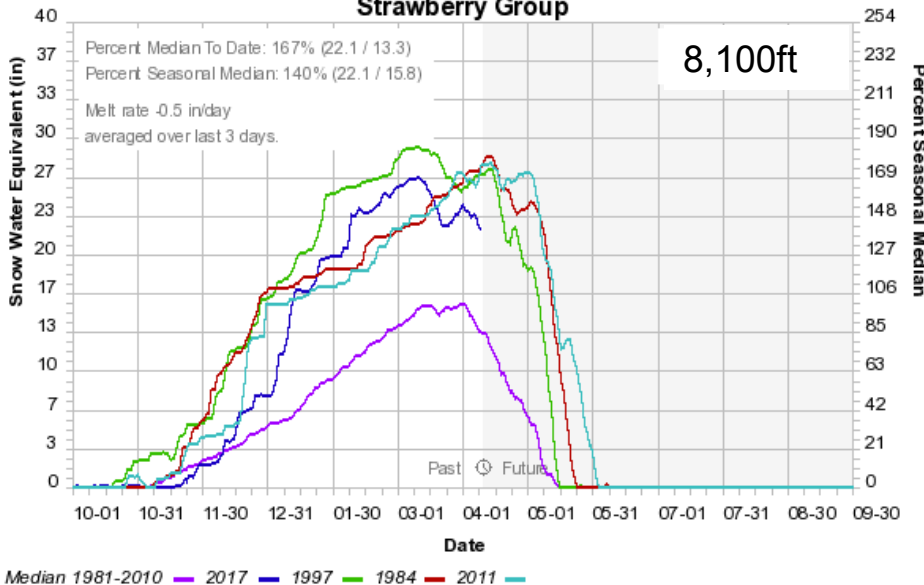


Currant Creek SNOTEL: 8,000 ft

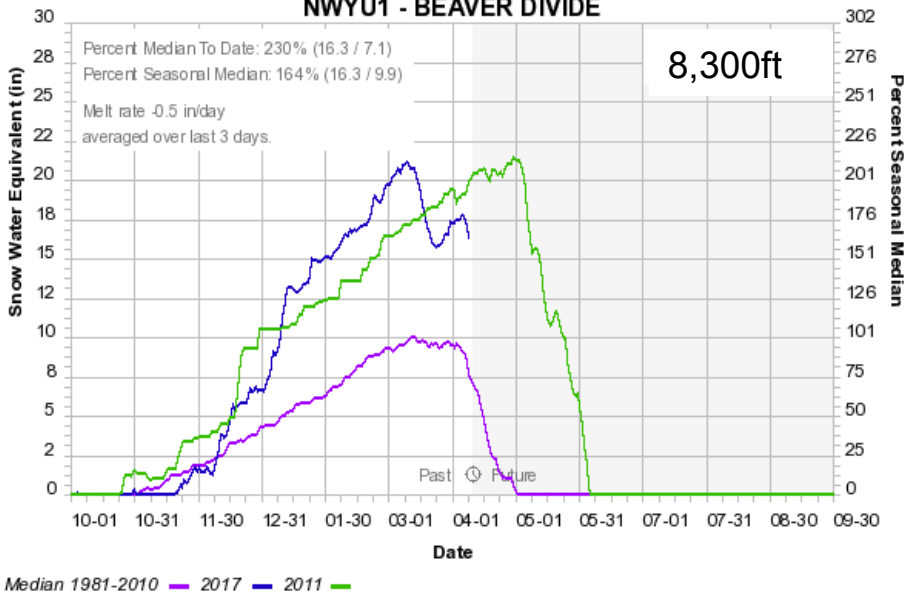


March Weather: Temperature Impacts on Snowpack

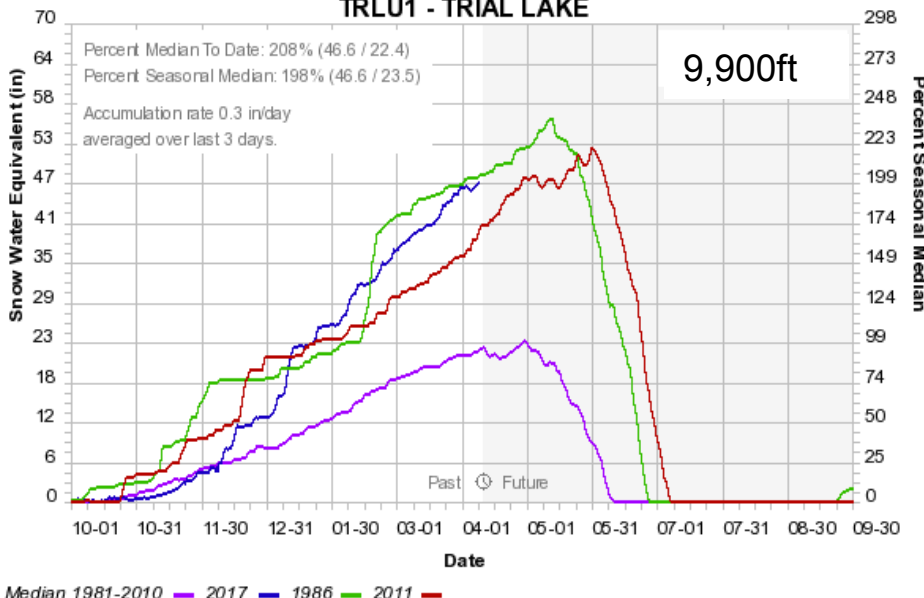
Colorado Basin River Forecast Center
Strawberry Group



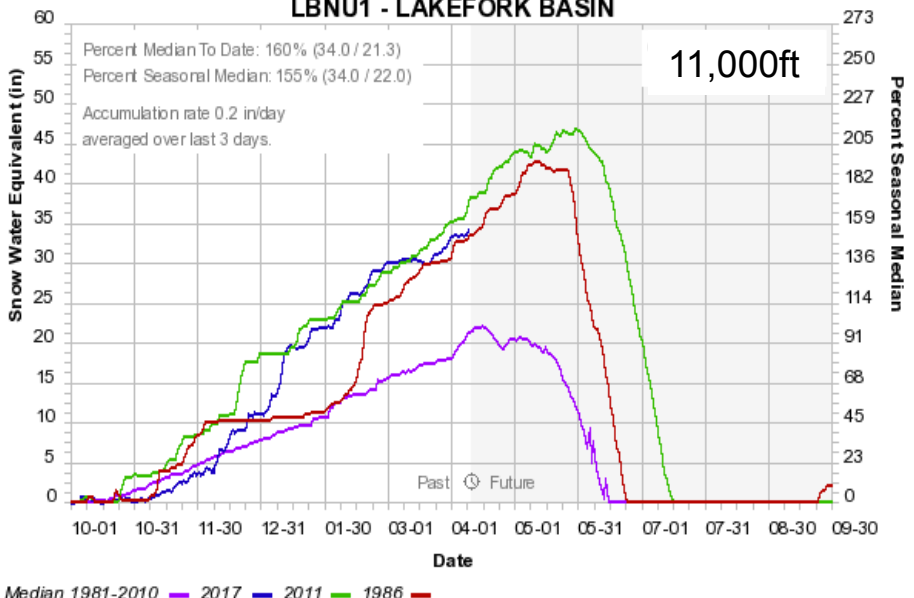
Colorado Basin River Forecast Center
NWyU1 - BEAVER DIVIDE



Colorado Basin River Forecast Center
TRLU1 - TRIAL LAKE

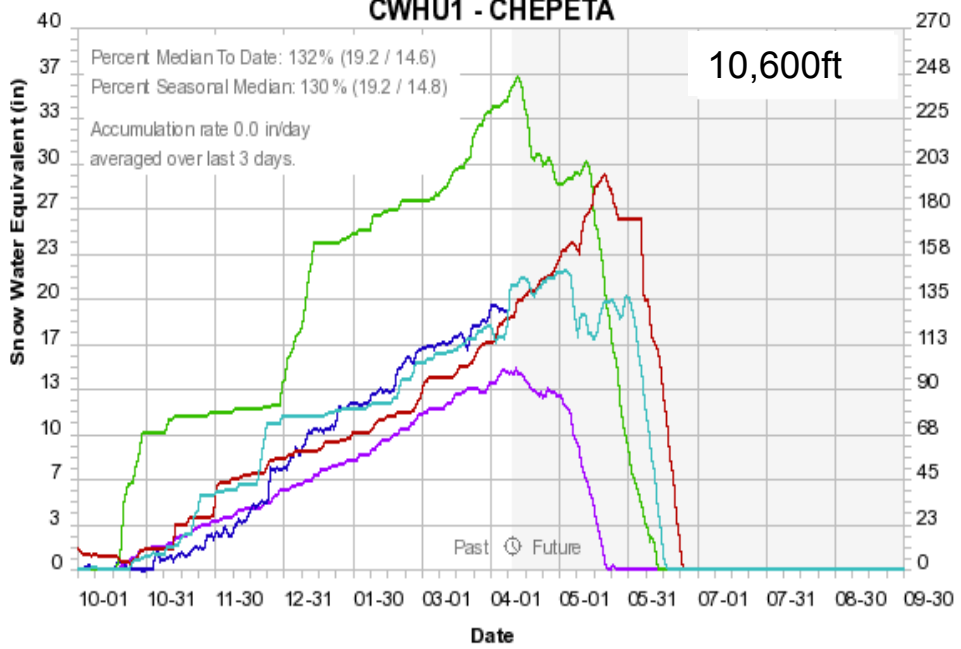


Colorado Basin River Forecast Center
LBNU1 - LAKEFORK BASIN

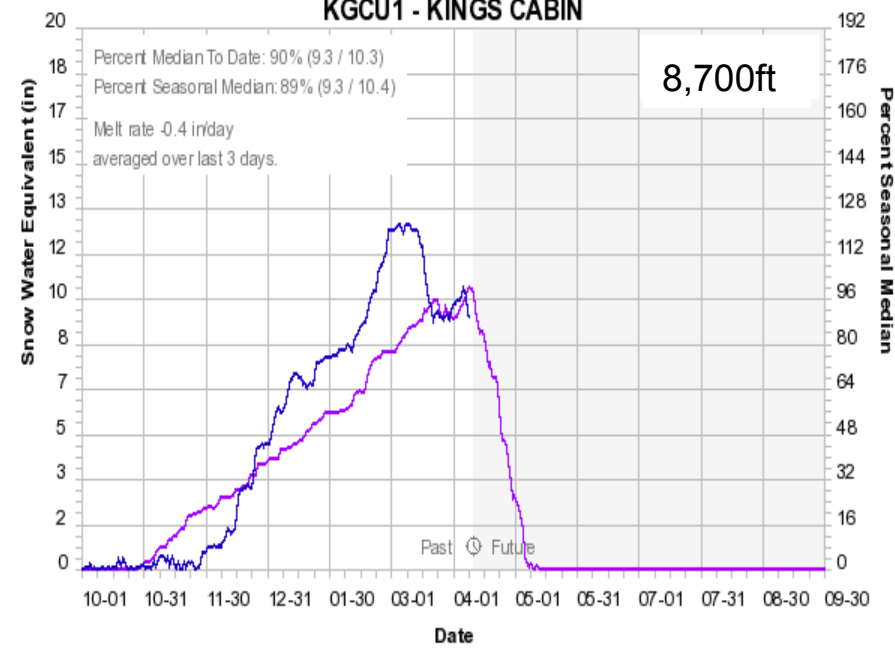


March Weather: Temperature Impacts on Snowpack

Colorado Basin River Forecast Center
CWHU1 - CHEPETA



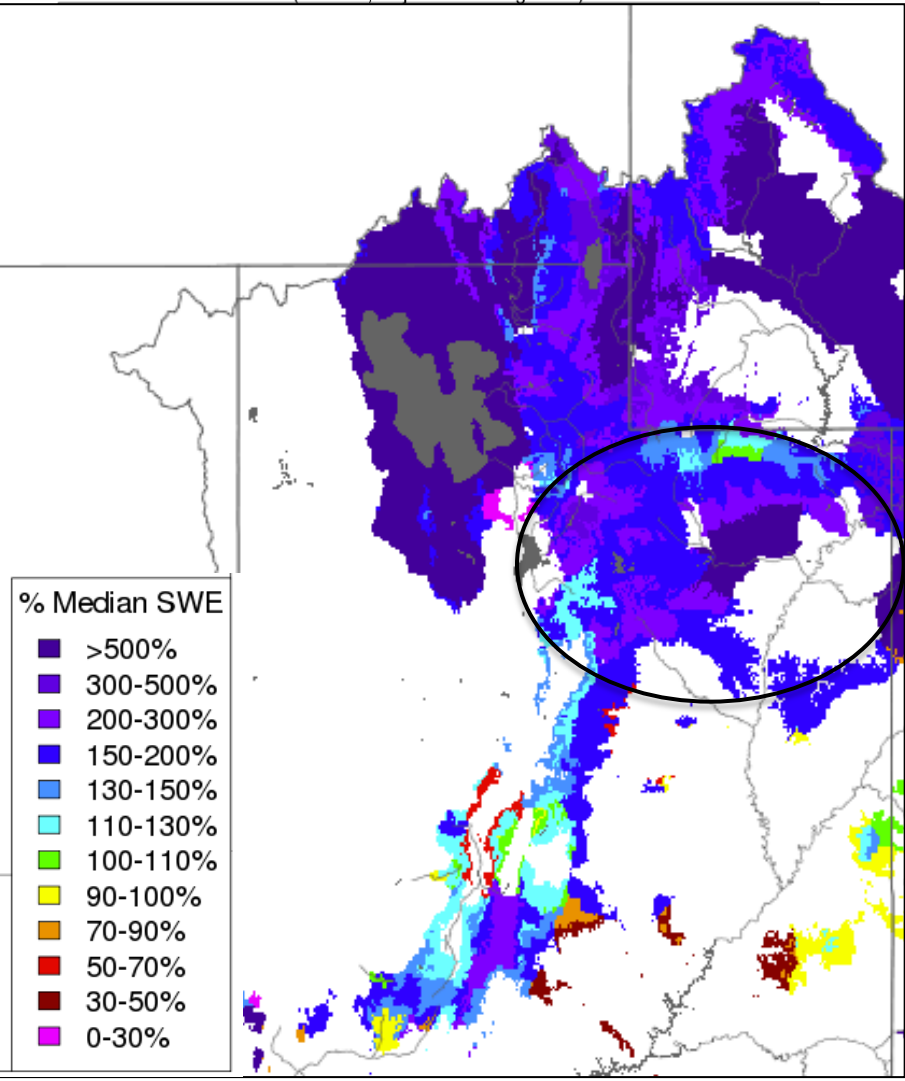
Colorado Basin River Forecast Center
KGPU1 - KINGS CABIN



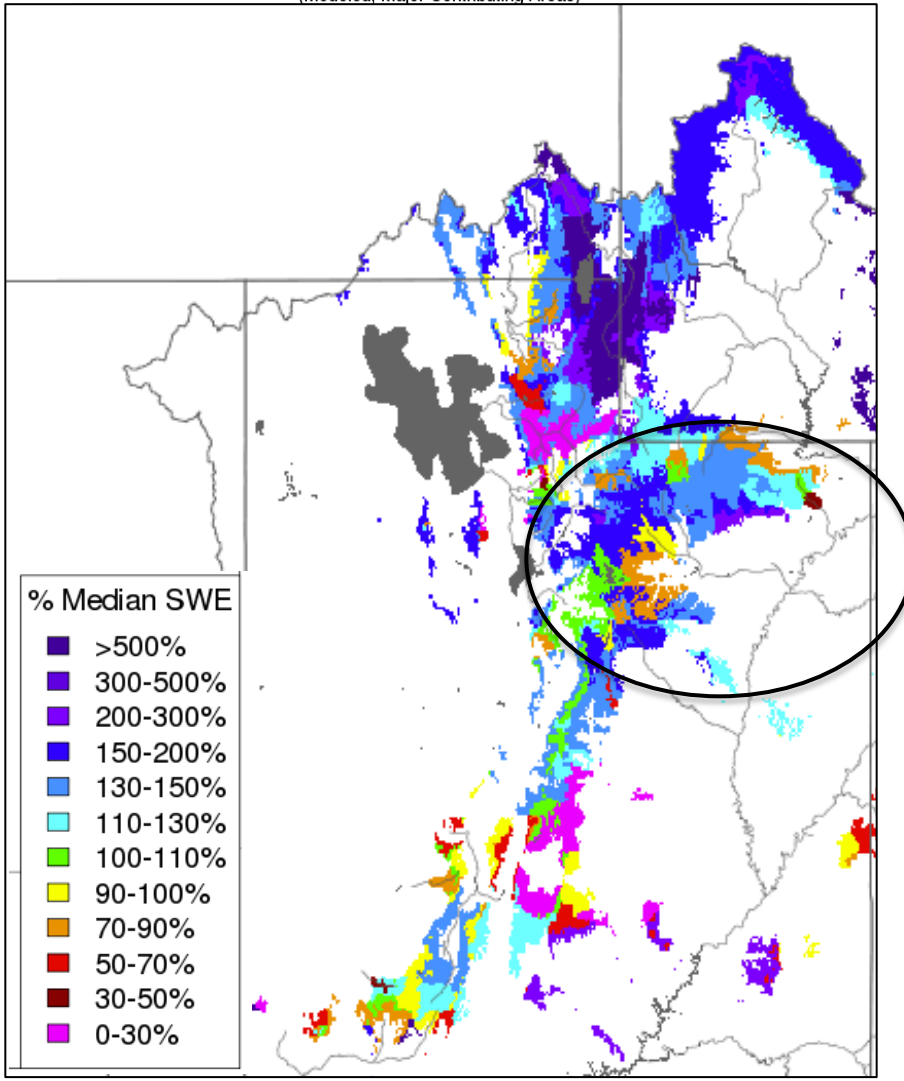
March Weather: Temperature Impacts on Snowpack

CBRFC MODEL SNOW (% median):

Snow Conditions - March 01 2017
(Modeled, Major Contributing Areas)



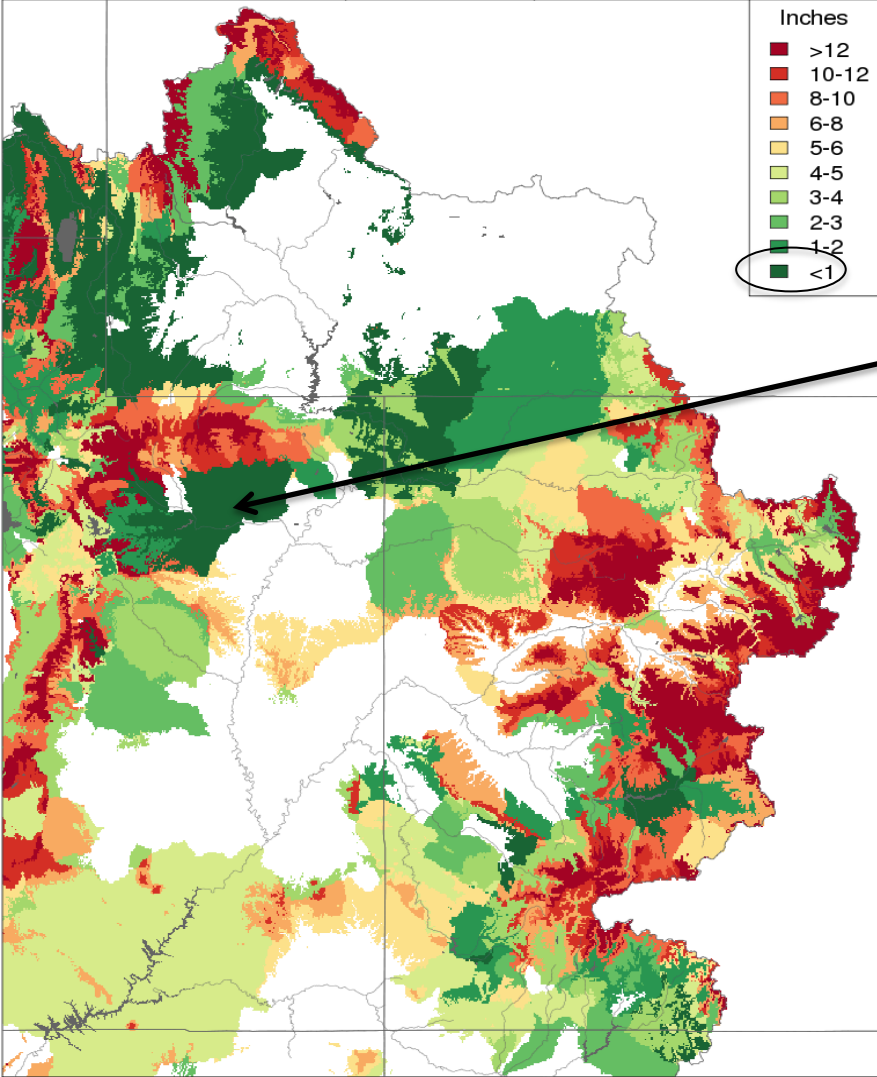
Snow Conditions - April 01 2017
(Modeled, Major Contributing Areas)



March Weather: Impacts to Soil Moisture

Current Model Soil Saturation Conditions

Soil Moisture - April 10 2017
(Inches to Saturation)



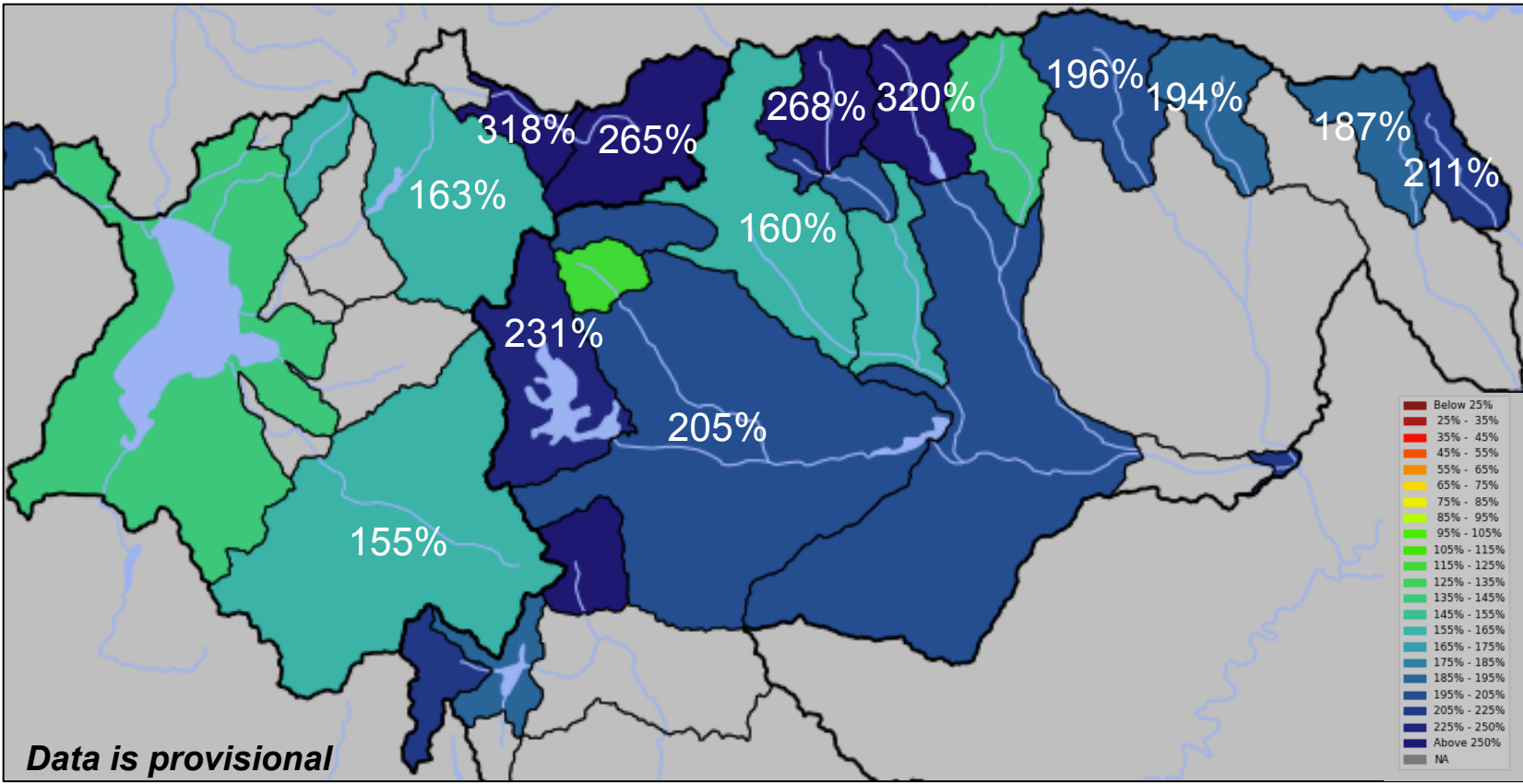
Lower elevation areas with significant snowpack in early March are saturated in the hydrologic model due to recent melt

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

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

March Weather: Streamflow Impacts

March % of Average Unregulated Streamflow



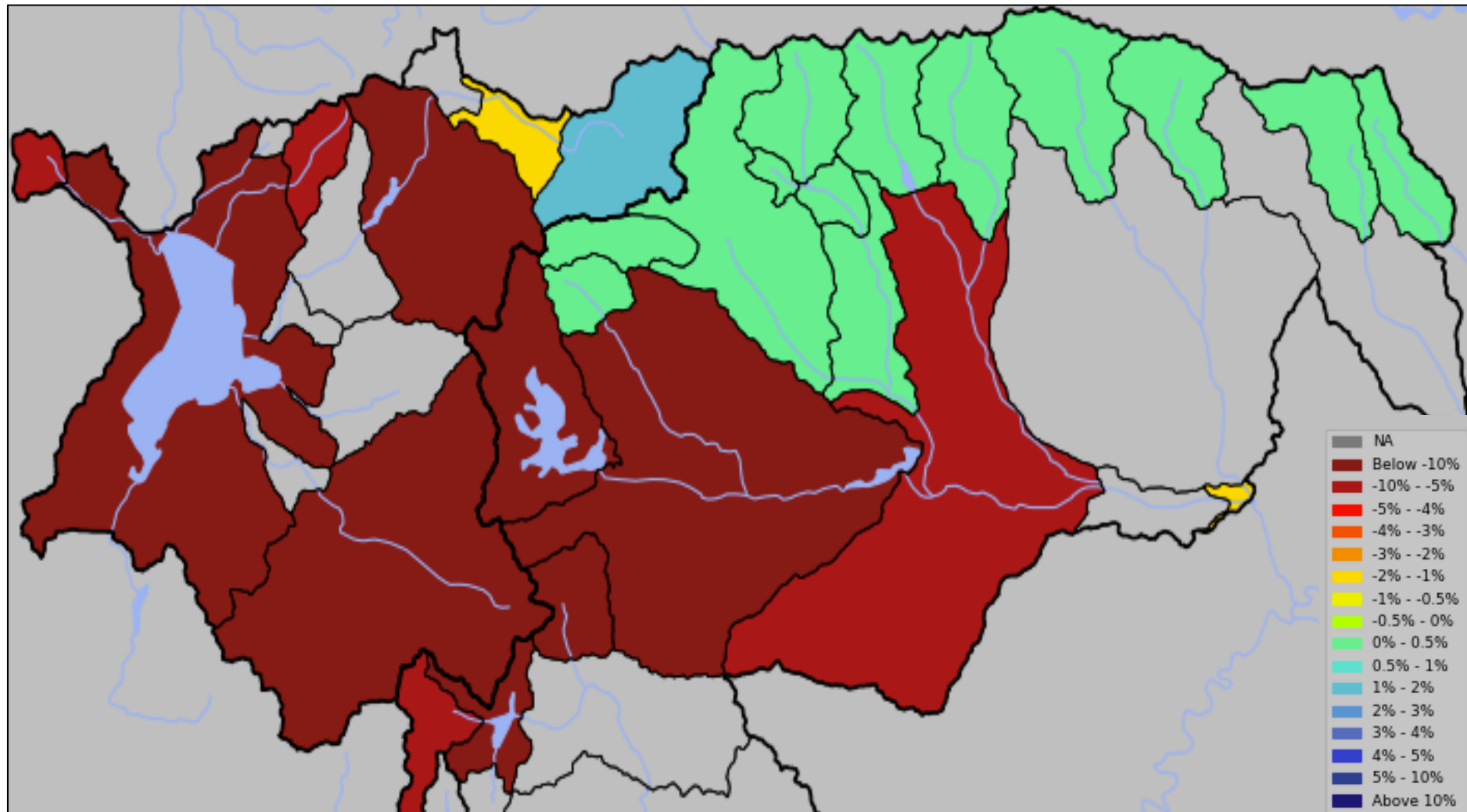
March Record Volumes (Rank/POR)

Provo-Woodland: 1/52
 Provo-Hailstone: 1/62
 West Fork-Duchesne: 1/37
 Upper Stillwater: 1/52
 South Fork-Rock Creek: 1/64

Rock Creek-Mt Home: 1/80
 Duchesne-Knights: 1/100
 Uinta River-Neola: 1/27
 Lake Fork-Moon Lake Inflow: 1/75
 Duchesne River-Randlett: 1/75

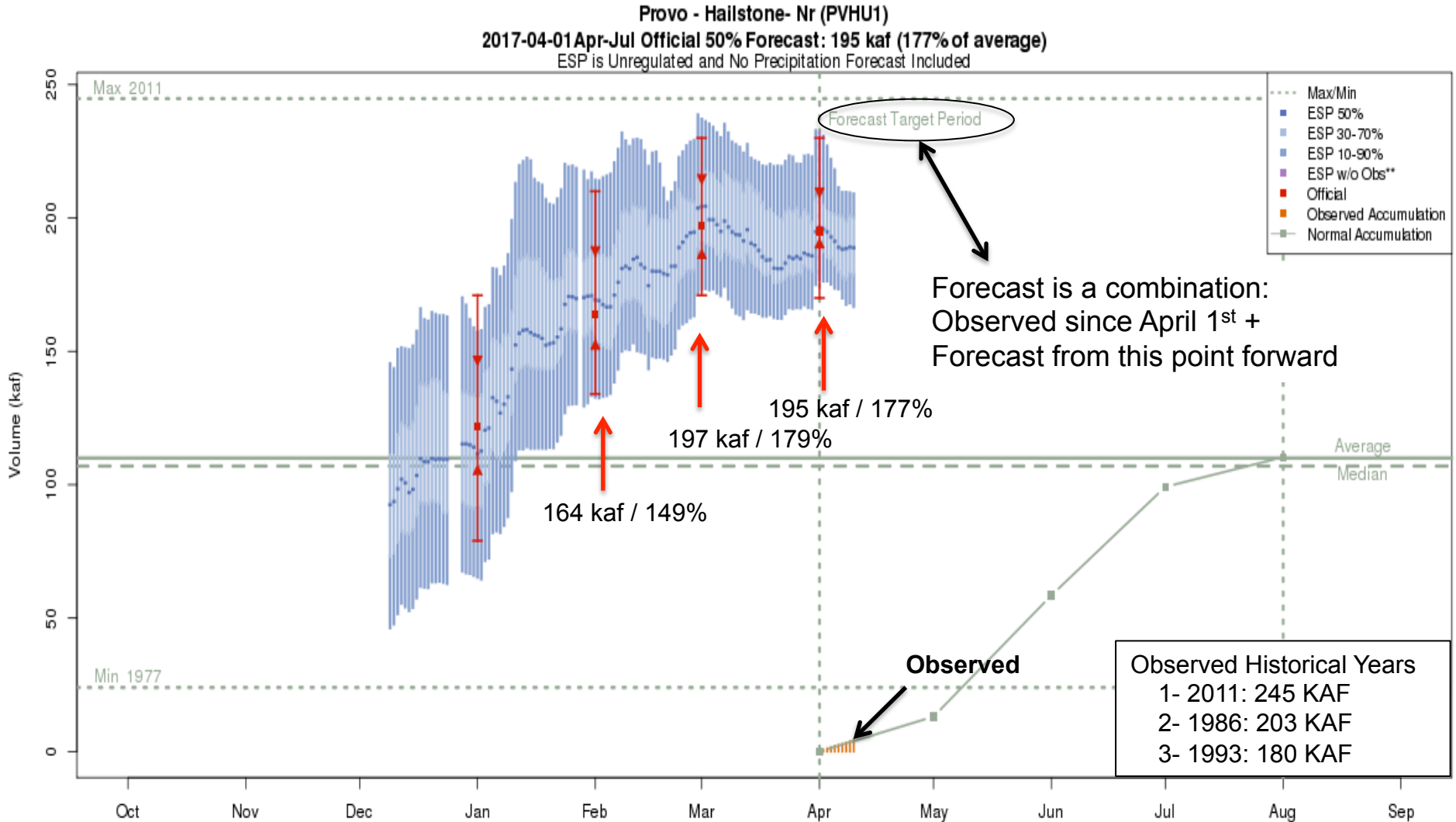
April 1st Water Supply Forecasts

April-July Forecast Streamflow Volumes
(% of Average Change from March 1st Forecasts)



Forecasted percent of average change from ~20% decrease to no change since March 1st

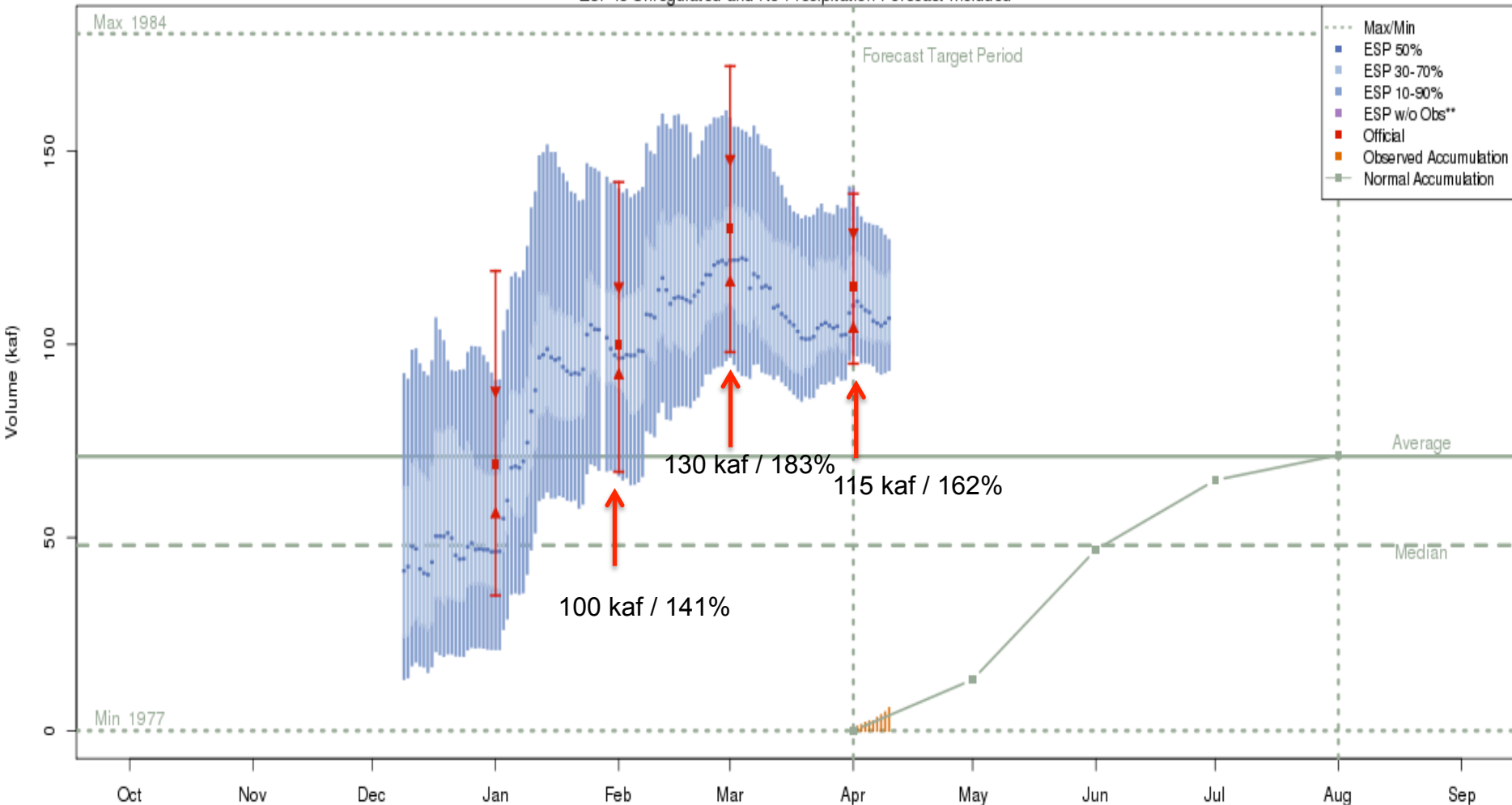
Forecasts: Provo nr Hailstone



The latest (2017-04-10) 50% ESP forecast is 189 kaf.
 Plot Created 2017-04-10 13:44:52, NOAA / NWS / CBRFC
 **Purple ESP forecasts do not include observed and are not total runoff.

Forecasts: Strawberry nr Solider Springs

Strawberry - Solider Springs-nr - Strawberry Res (STIU1)
 2017-04-01 Apr-Jul Official 50% Forecast: 115 kaf (162% of average)
 ESP is Unregulated and No Precipitation Forecast Included



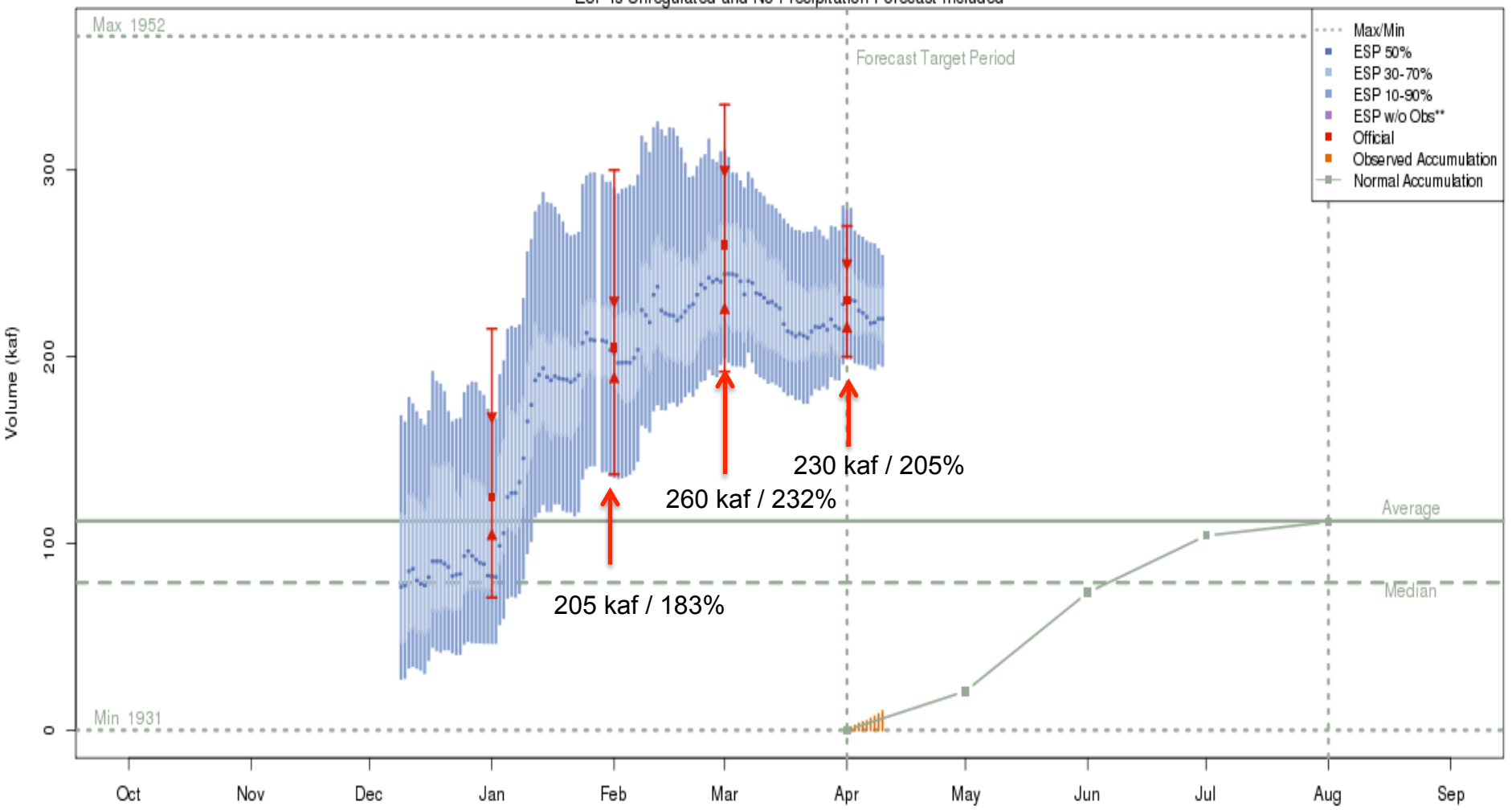
The latest (2017-04-10) 50% ESP forecast is 107 kaf.

Plot Created 2017-04-11 11:39:11, NOAA / NWS / CBRFC

**Purple ESP forecasts do not include observed and are not total runoff.

Forecasts: Starvation Reservoir

Strawberry - Starvation Res- Duchesne- Nr (STAU1)
 2017-04-01 Apr-Jul Official 50% Forecast: 230 kaf (205% of average)
 ESP is Unregulated and No Precipitation Forecast Included



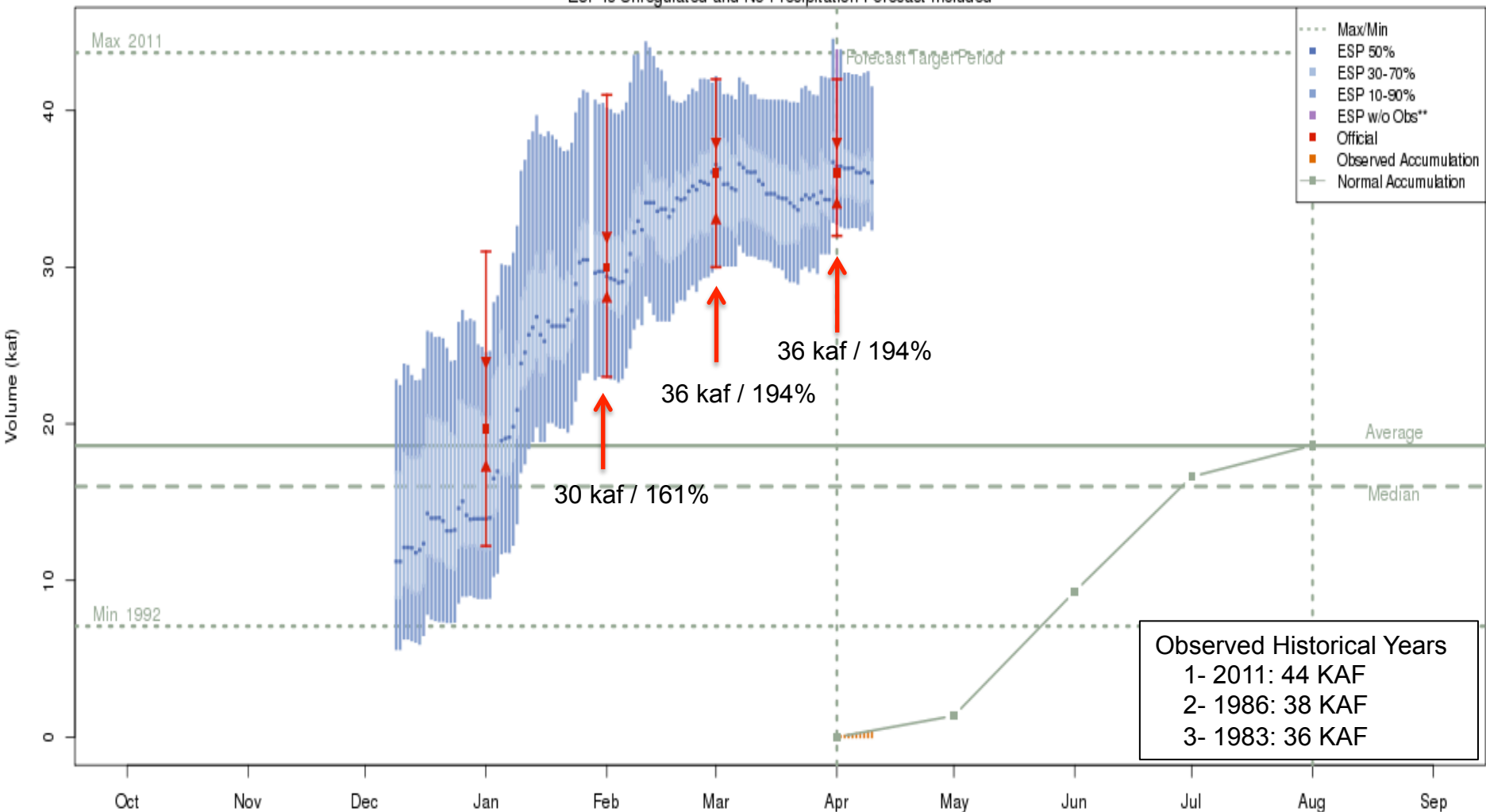
The latest (2017-04-10) 50% ESP forecast is 220 kaf.

Plot Created 2017-04-10 13:50:26, NOAA / NWS / CBRFC

**Purple ESP forecasts do not include observed and are not total runoff.

Forecasts: West Fork below Vat

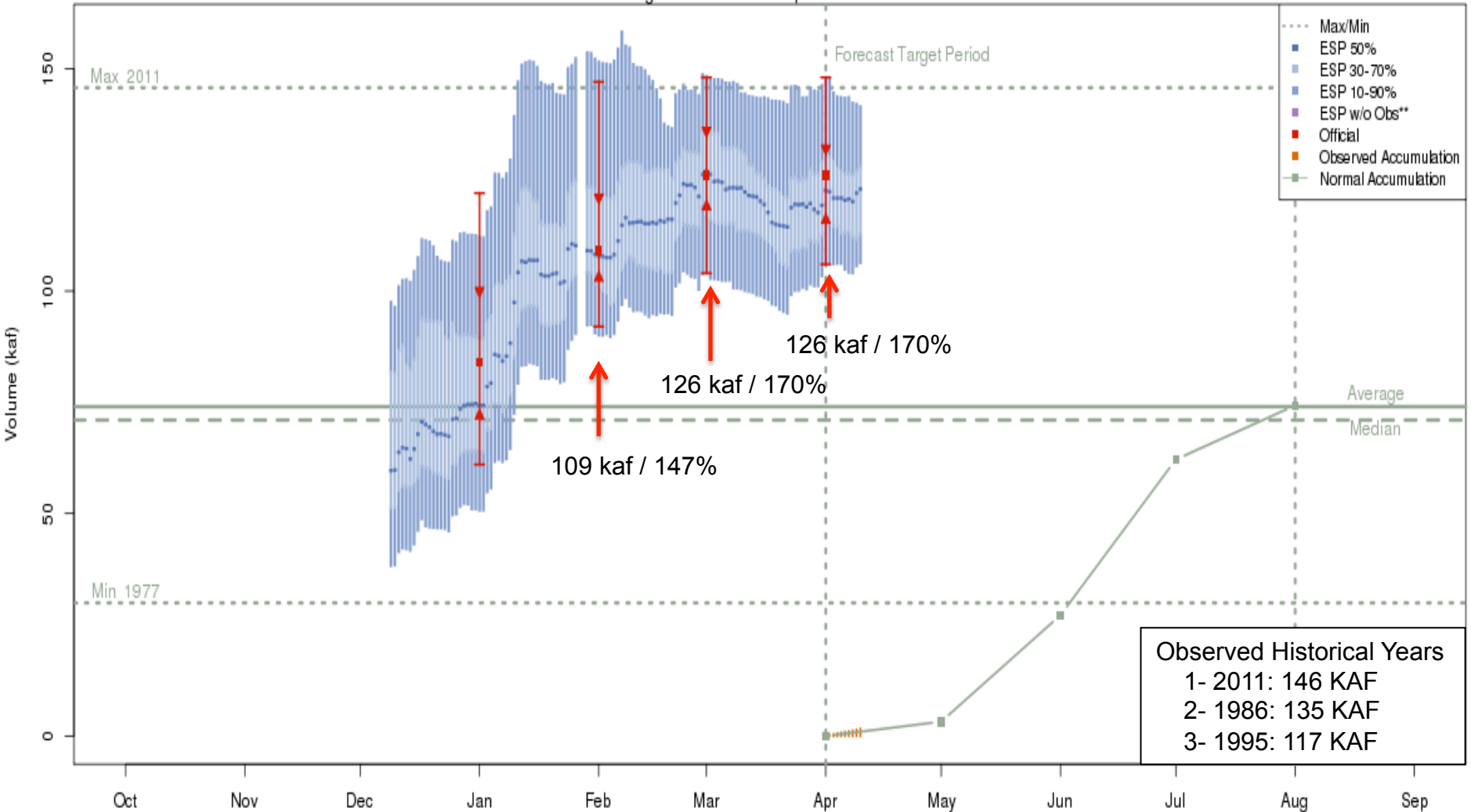
West Fork Duchesne - Vat Diversion- Blo (WFDU1)
 2017-04-01 Apr-Jul Official 50% Forecast: 36 kaf (194% of average)
 ESP is Unregulated and No Precipitation Forecast Included



The latest (2017-04-10) 50% ESP forecast is 35 kaf.
 Plot Created 2017-04-10 13:56:52, NOAA / NWS / CBRFC
 **Purple ESP forecasts do not include observed and are not total runoff.

Forecasts: Upper Stillwater Reservoir

Rock Ck - Upper Stillwater Res (USTU1)
2017-04-01 Apr-Jul Official 50% Forecast: 126 kaf (170% of average)
 ESP is Unregulated and No Precipitation Forecast Included



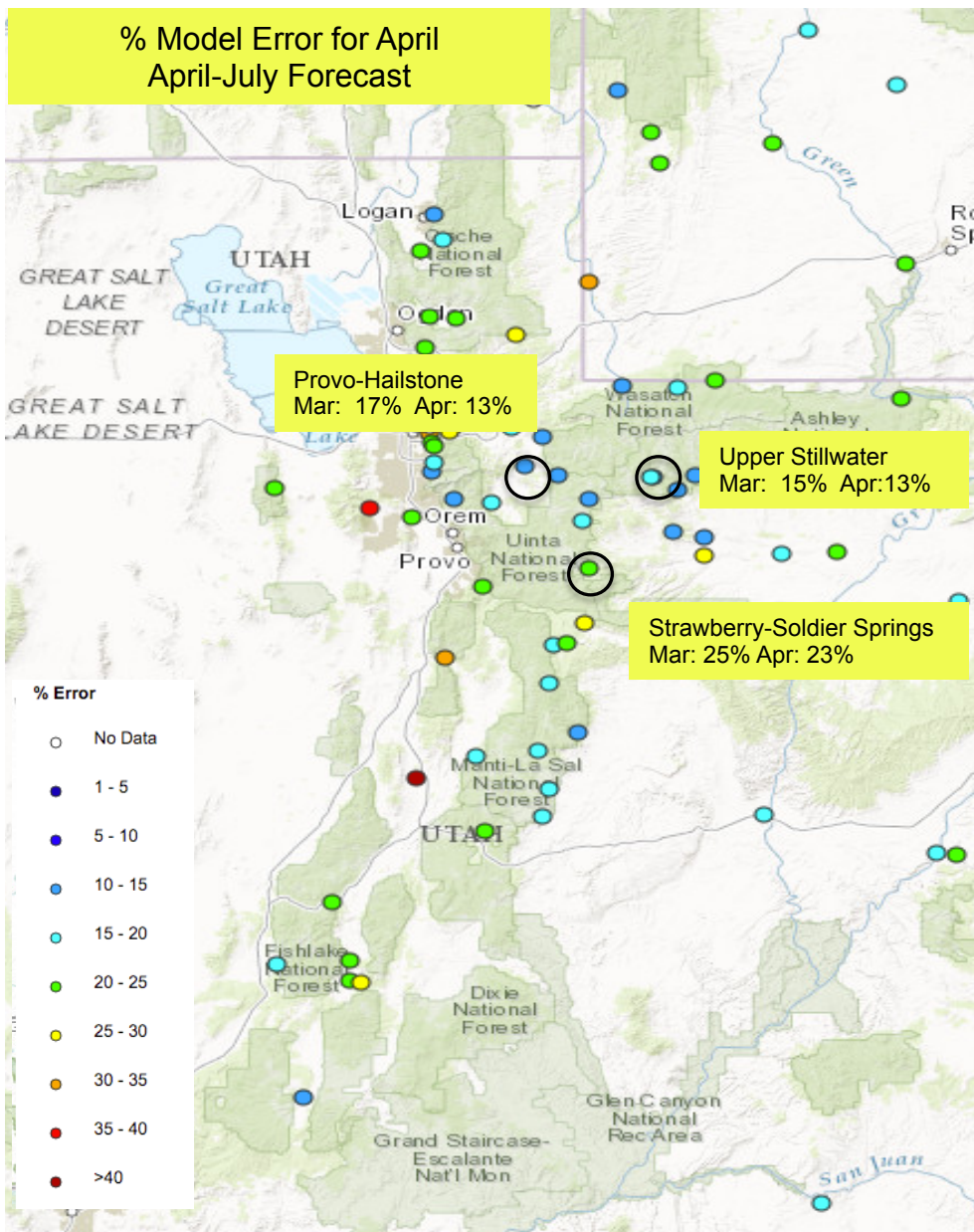
The latest (2017-04-10) 50% ESP forecast is 123 kaf.

Plot Created 2017-04-10 13:53:18, NOAA / NWS / CBRFC

**Purple ESP forecasts do not include observed and are not total runoff.

Forecast Accuracy? How good are the forecasts in April?

% Model Error for April
April-July Forecast



Historical Model Error
1981-2010

Improvement in forecast error between March & April

Forecasts are better than just going with average

Primary sources of error from this point forward:

Extreme weather (wet or dry)

Correct model representation of snowpack

Saturated lower elevations (near model max)

Long Lead Peak Flow Outlooks

MEAN DAILY PEAK FLOW FORECASTS IN CFS

April 6, 2017

LOCATION	FLOOD	FCST	FORECAST FLOWS					TYPE
	FLOW	DATE	90%	75%	50%	25%	10%	
BIG BRUSH CK - VERNAL, NR, RED FLEET RES, ABV	-999	2017-04-04	200	250	300	350	400	UNREG
STRAWBERRY - SOLIDER SPRINGS, NR - STRAWBERRY	-999	2017-04-04	900	1000	1200	1300	1400	UNREG
CURRENT CK - CURRENT CK RES	-999	2017-04-04	450	550	600	650	750	UNREG
STRAWBERRY - STARVATION RES, DUCHESNE, NR	-999	2017-04-04	700	900	1100	1200	1400	REG
STRAWBERRY - STARVATION RES, DUCHESNE, NR	-999	2017-04-04	1900	2200	2500	3000	3500	UNREG
WEST FORK DUCHESNE - VAT DIVERSION, BLO	721	2017-04-04	200	250	300	350	450	REG
WEST FORK DUCHESNE - VAT DIVERSION, BLO	721	2017-04-04	350	450	500	600	700	UNREG
DUCHESNE - TABIONA, NR	2730	2017-04-04	1000	1200	1400	1800	2000	REG
DUCHESNE - TABIONA, NR	2730	2017-04-04	1500	1700	1900	2200	2500	UNREG
ROCK CK - UPPER STILLWATER RES	-999	2017-04-04	1200	1400	1600	2000	2500	UNREG
DUCHESNE - DUCHESNE, NR, KNIGHT DIV, ABV	-999	2017-04-04	1700	2000	2500	3000	4000	REG
DUCHESNE - DUCHESNE, NR, KNIGHT DIV, ABV	-999	2017-04-04	2500	3000	3500	4500	5000	UNREG
PROVO - WOODLAND, NR	3114	2017-04-04	1900	2100	2350	2850	3150	REG
PROVO - WOODLAND, NR	3114	2017-04-04	1700	1900	2100	2500	2900	UNREG

UNREG= Peak flow forecasts are unregulated and do not account for upstream diversions/regulation.

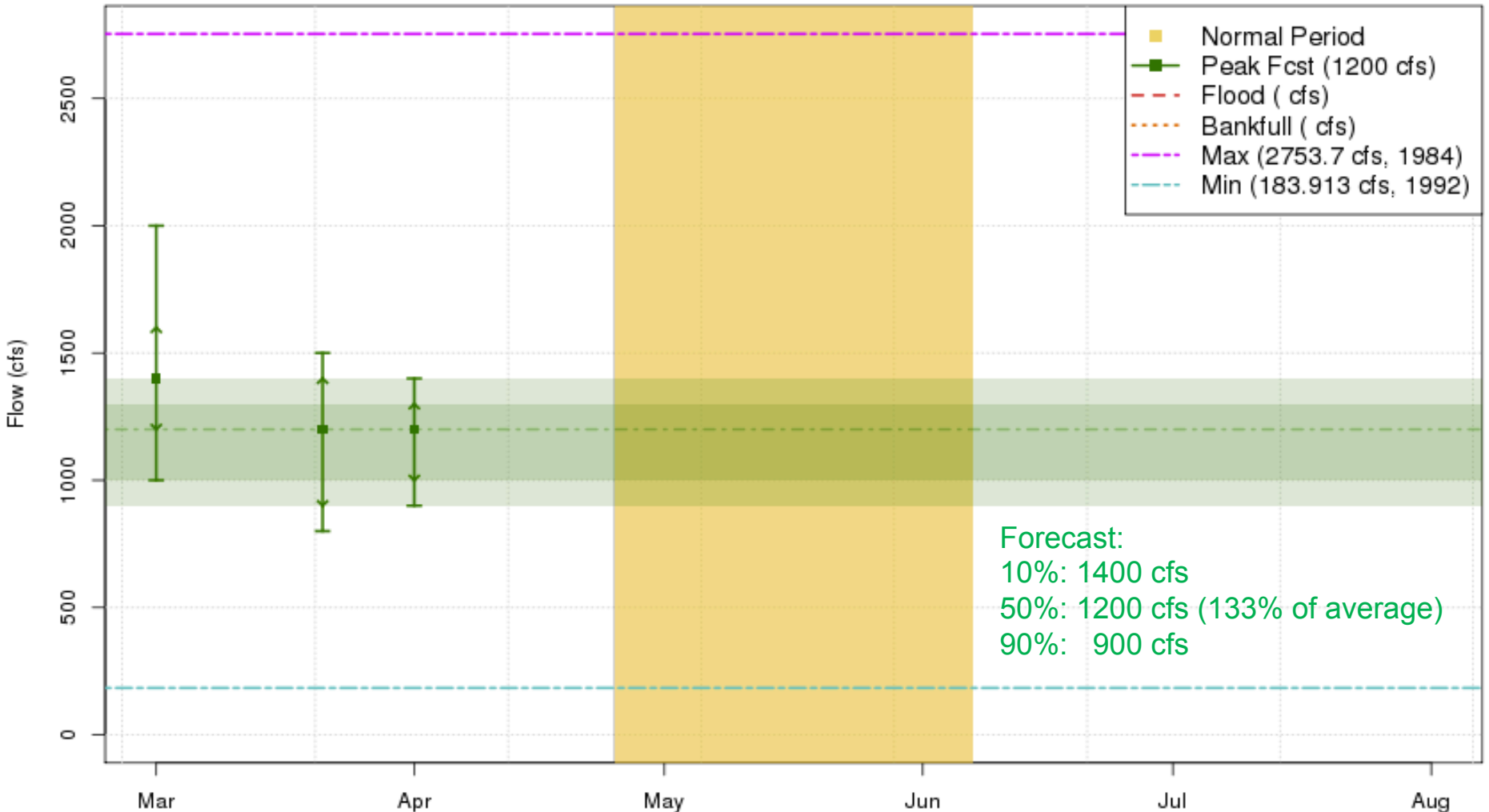
REG= Peak flow forecasts are regulated based on assumptions of upstream diversions/regulations.

FLOOD= Flood flow. -9999 = no flood flow

Regulated flow at Provo-Woodland includes diversions from the Duchesne Tunnel whereas unregulated flows do not.

Long Lead Peak Flow Outlook: Strawberry nr Solider Springs

2017 Mean Daily Peak Flow Forecast
Strawberry - Solider Springs-nr - Strawberry Res (STIU1)

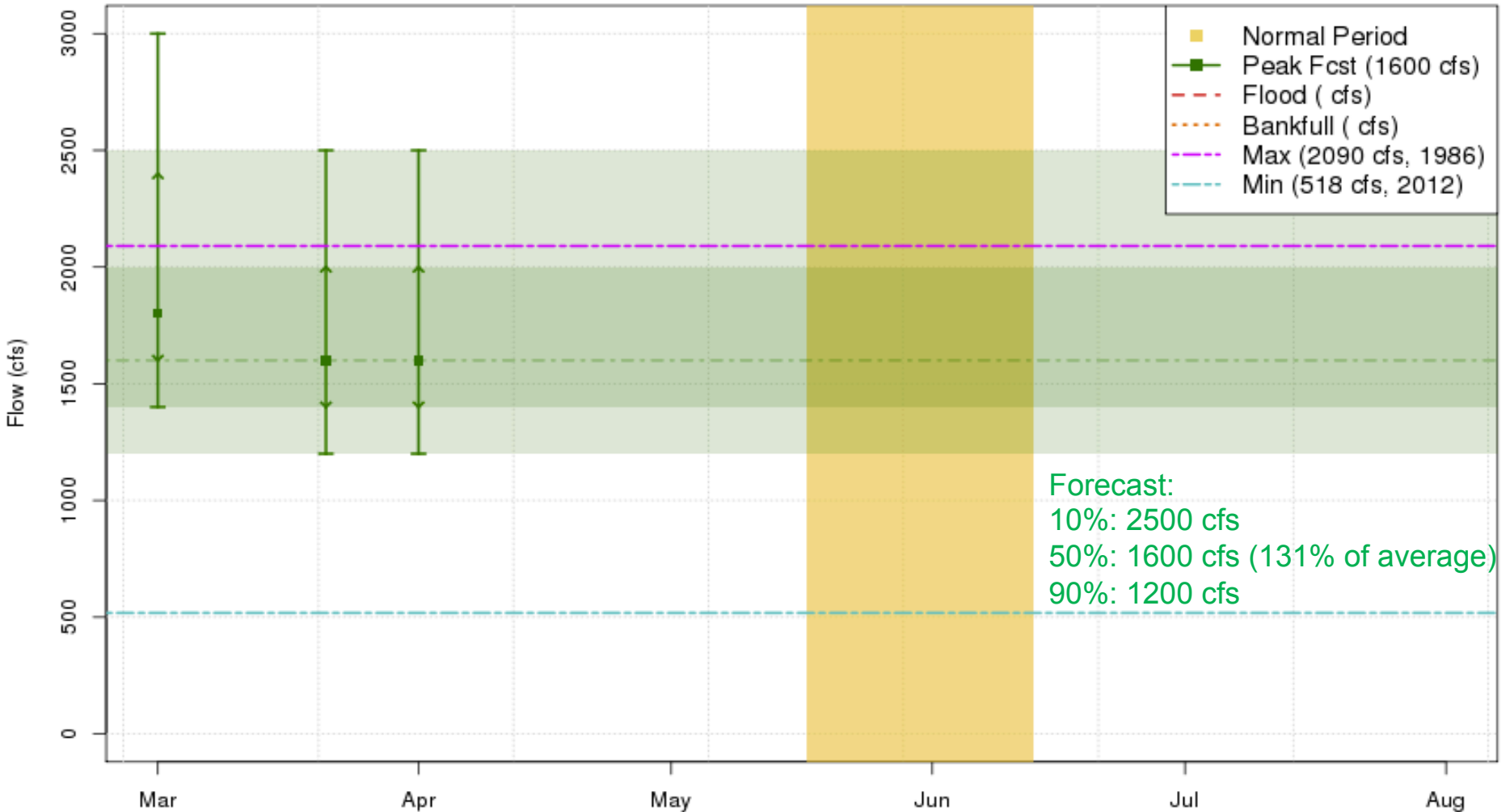


These graphics are updated approximately every two weeks between 3/1 and 5/1

Plot Created 2017-04-06 10:01:44
CBRFC / NWS / NOAA

Long Lead Peak Flow Outlook: Upper Stillwater Inflow

2017 Mean Daily Peak Flow Forecast
Rock Ck - Upper Stillwater Res (USTU1)



These graphics are updated approximately every two weeks between 3/1 and 5/1

Plot Created 2017-04-06 10:01:57
CBRFC / NWS / NOAA

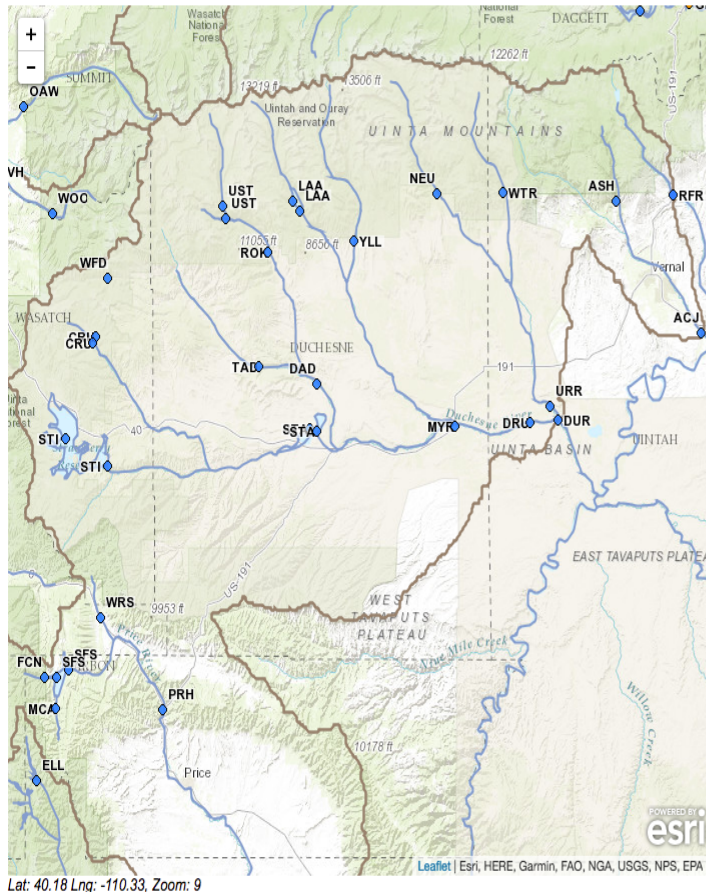
10-Day Deterministic Streamflow Forecasts

COLORADO BASIN RIVER FORECAST CENTER
 NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME RIVERS SNOW WATER SUPPLY RESERVOIRS WEATHER CLIMATE HELP ABOUT NEWS SEARCH

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 Check out the Upper Colorado Situational Awareness Page: [More Info...](#)

Conditions Map [Help](#)

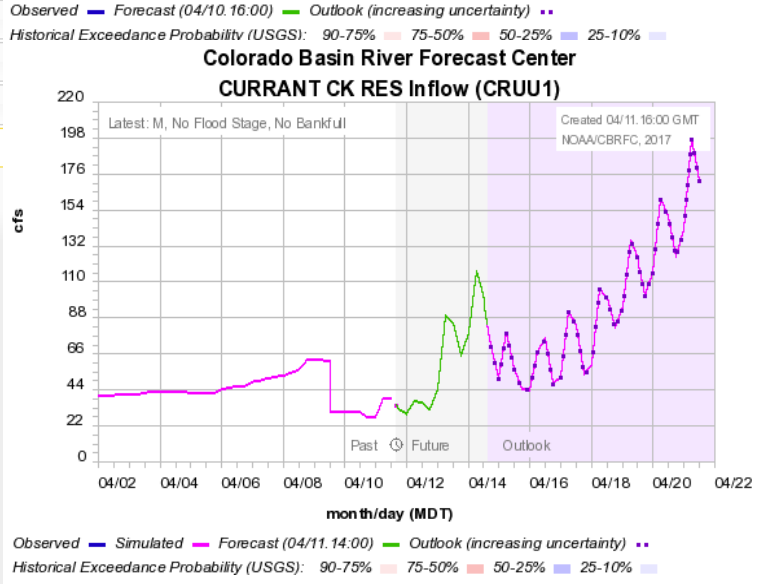
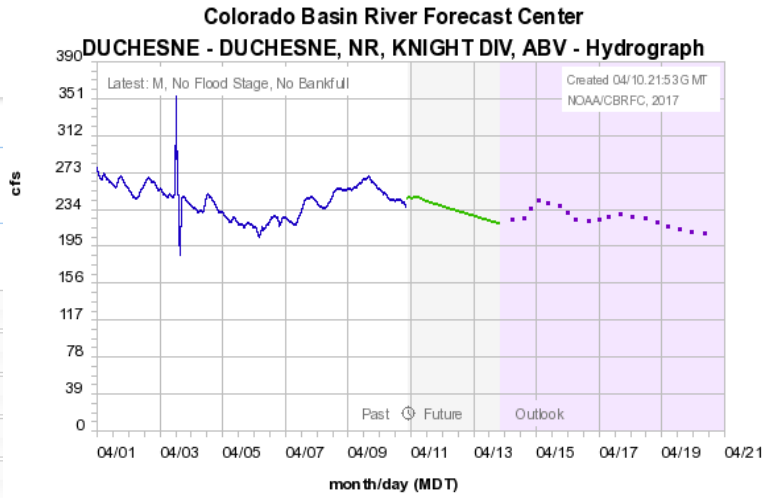


- ▶ River Conditions
- ▶ Snow Conditions
- ▶ Water Supply Forecasts
- ▶ Peak Flood Probability
- ▶ Reservoir Conditions
- ▶ Daily Precipitation
- ▶ Monthly Precipitation
- ▶ Soil Moisture
- ▶ Map Options

Map Options

Base Map Boundaries Zoom Areas

Entire CBRFC
Upper Colorado
 Col abv Kremmling
 Eagle-Roaring Fork
 Gunnison
 Dolores
 Lake Powell
Green
 Upper Green
 White-Yampa
 Duchesne-Price
 San Rafael-Dirty Devil
San Juan
 San Juan
Great
 Bear
 Weber
 Six Creeks-Jordan
 Provo-Utah Lake
 Salt Lake
Sevier



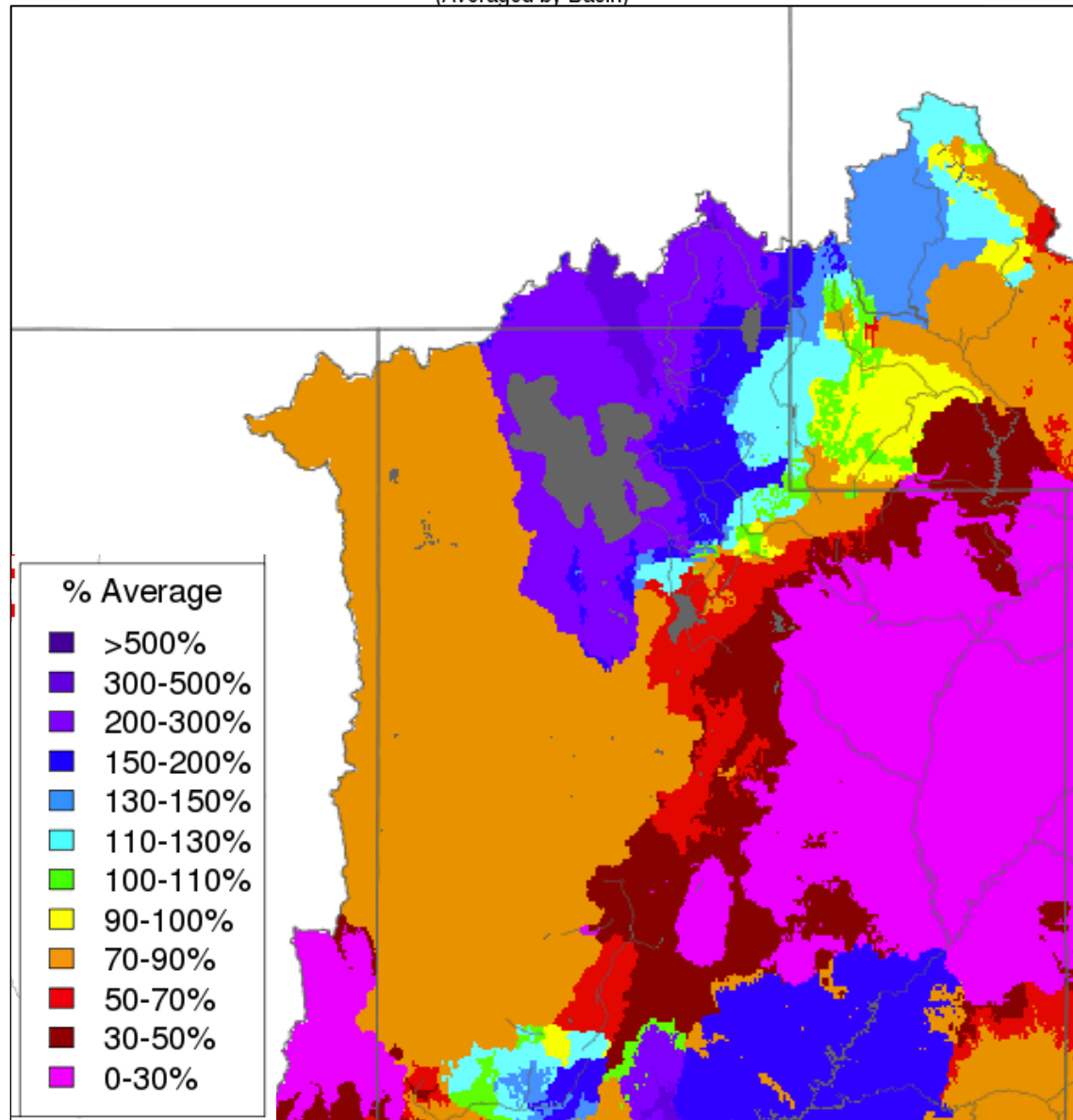
www.cbrfc.noaa.gov

Better tool when melt begins. Regulated flow. Flow you would expect to see in the river. Updated every morning by 10 am.

April Weather: Precipitation so far....

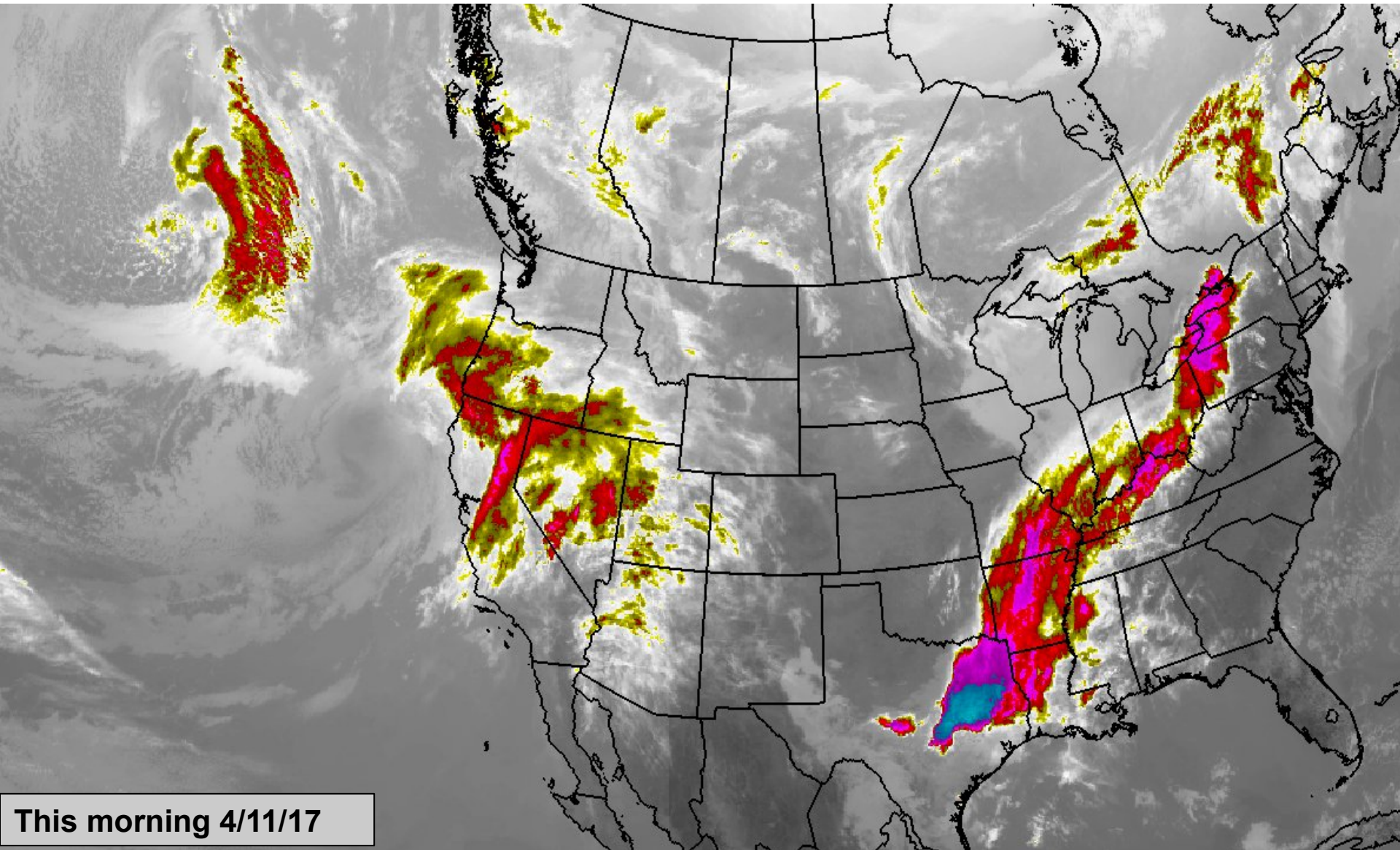
Month to Date Precipitation - April 10 2017

(Averaged by Basin)



Upcoming Weather and Impacts to Water Supply Forecasts

High clouds increasing today ahead of next storm. Storm will weaken with little chance of precipitation.

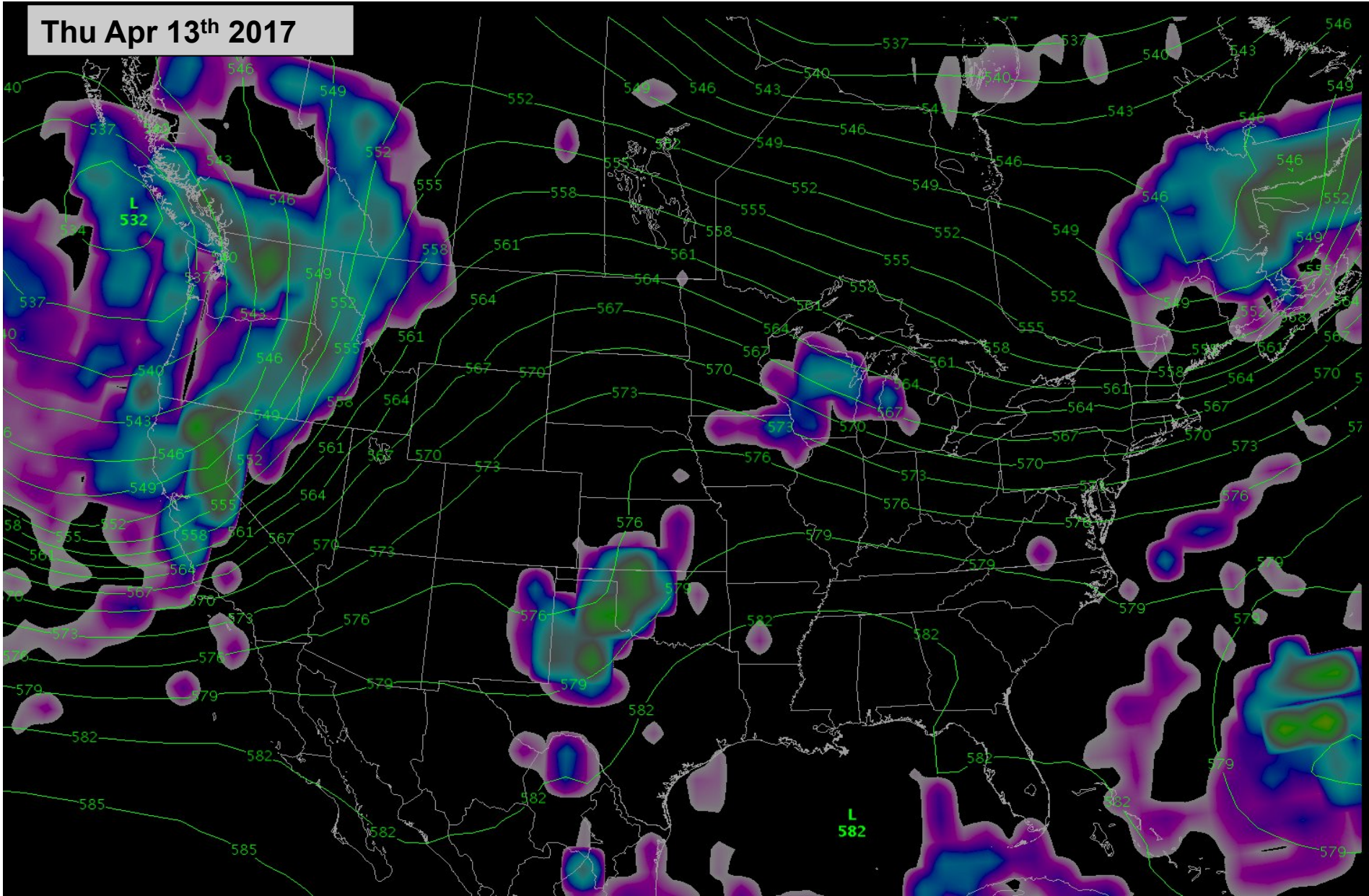


This morning 4/11/17

Upcoming Weather and Impacts to Water Supply Forecasts

A warm southwest flow Wednesday and Thursday before next storm Thursday evening.

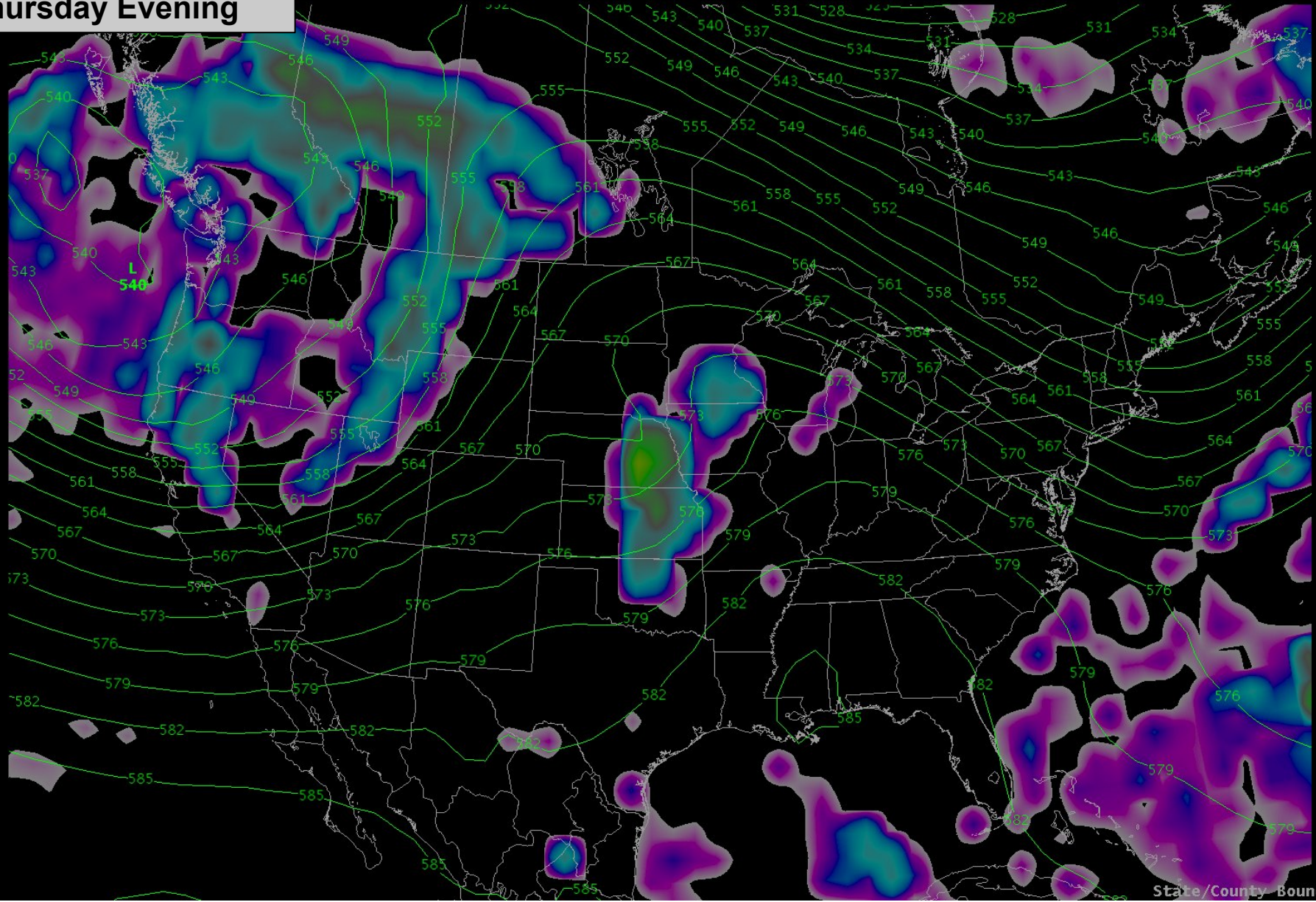
Thu Apr 13th 2017



Upcoming Weather and Impacts to Water Supply Forecasts

Cold front arrives Thursday evening but loses support. Minimal precipitation will be north of SLC.

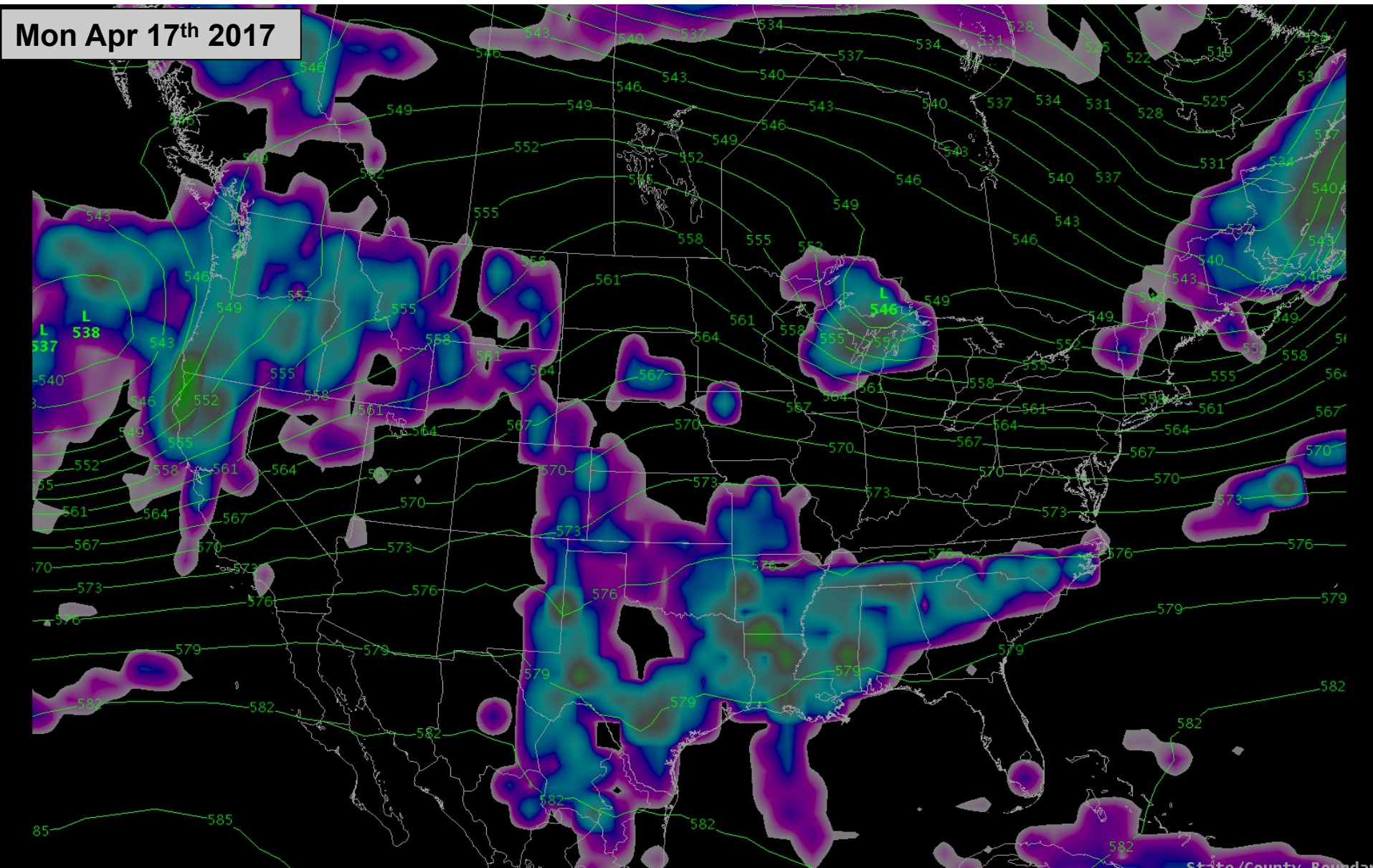
Thursday Evening



State/County Boundaries

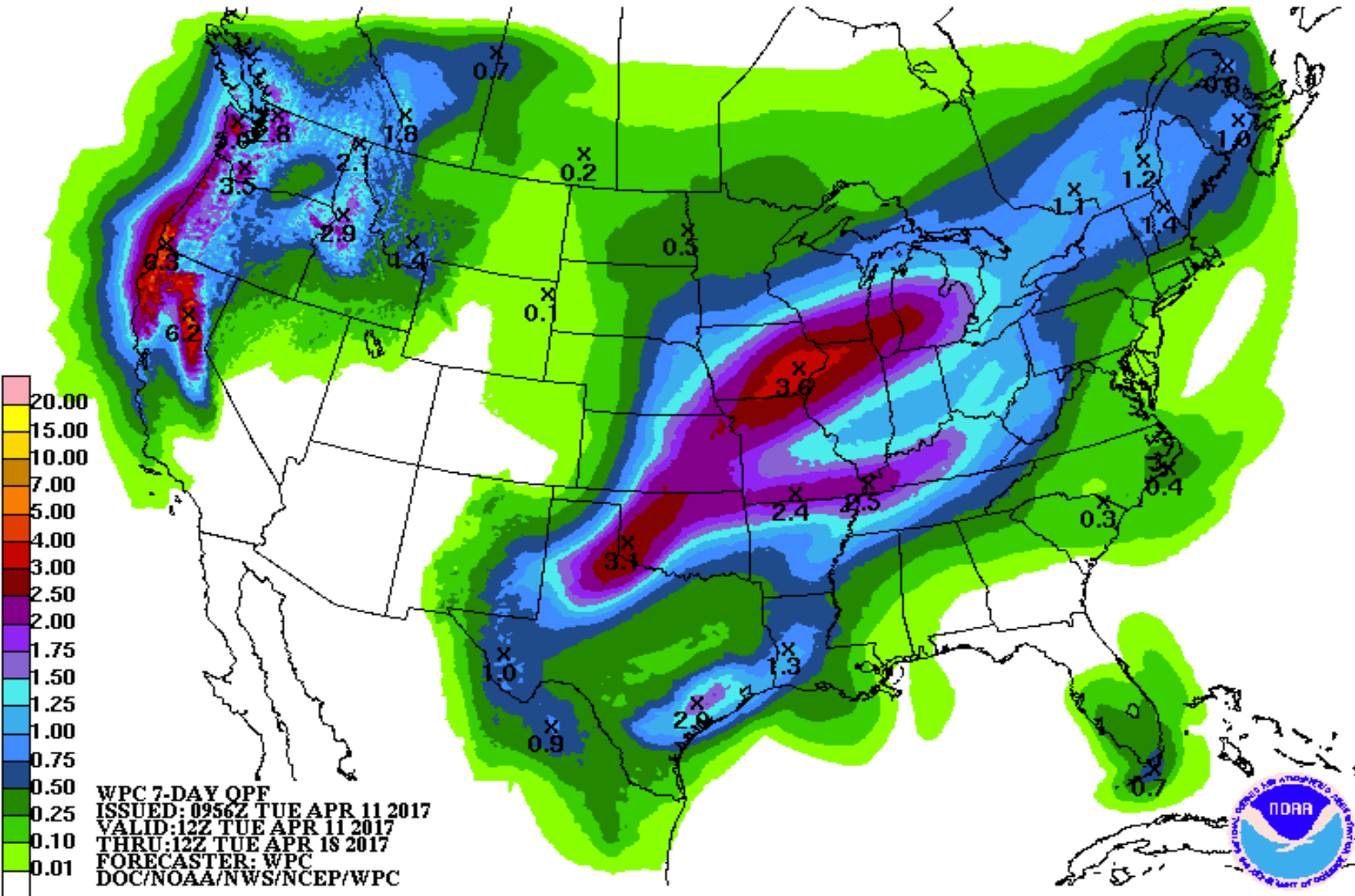
Upcoming Weather and Impacts to Water Supply Forecasts

Series of storms over the next week. Limited precip with best chance north of SLC. Models suggest weather pattern will stay active through at least the 3rd week of April.



Upcoming Weather and Impacts to Water Supply Forecasts

Precipitation Forecast: 7 day total (Apr 11th- Apr 18th)



Key Points/Discussion

Key Points:

- Melted significant amount of lower elevation snow in March
 - Benefits to reducing (not eliminating) flood threats
- Lower elevation areas are saturated (model)
- Some of previous forecast April-July volume ended up in March (lower elevation basins)
- April-July forecasted volumes decreased or remained unchanged
- Significant snowpack still remains at high elevations
- Significant runoff and above average peak flows expected in Duchesne and Provo River Basins

- At this time April looks active with a series of storms and dry/warm periods however precipitation looks limited for the Duchesne and Provo River Basins.
- May see decreasing trend or minimal impact to water supply forecasts by mid-month

Operations Discussion

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

Next briefing date?